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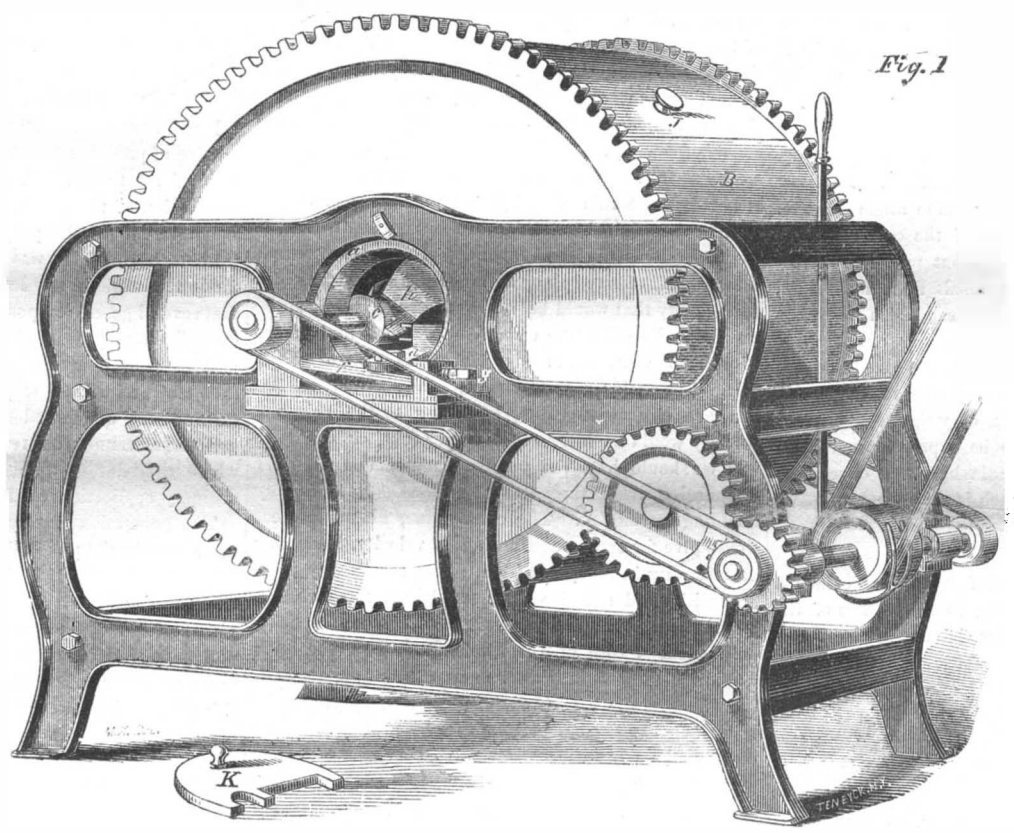
## IMPROVED RAG-PICKER.

As, in the great laboratory of nature, the most disagreeable and worthless substances are transformed into beautiful flowers, delicious fruits, or waving fields of grain, so, in the operations of the paper-maker, the rags that hang from the limbs of the beggar, or are raked from the mud of the gutter, are converted into smooth and beautiful sheets, and endowed with the marvelous power of bearing the impalpable thoughts of the present generation down the current of time to generations yet unborn. Viewed in this true light, the working of rags loses the contemptible character with which a conventional prejudice has regarded it, and we behold a portion of that thaumaturgic power which excites our perpetual wonder in the action of the mysterious forces of nature. This consideration may induce us to examine improvements in a rag-picker with at least as much interest as we feel in examining those in any other machine.

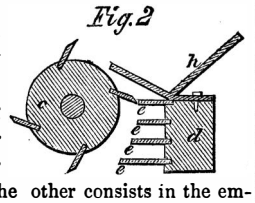
The accompanying engravings illustrate an improvement in that class of rag-pickers in which the operation is conducted in the inside of a drum, by means of a revolving cutter in combination with stationary knives. The trunnions, *a*, of the drum, B, are made hollow, in order to permit the passage through the drum of the shaft, *c*, which carries the revolving cutters, and of the bar, *d*, which supports the stationary knives. The knives are four in number, as shown at *e e e e*, Fig. 2, and the revolving cutters are wound spirally around their shaft in the usual manner. This shaft is furnished with drums and belts at both ends, so that the wear in its journals may not change its parallelism with the knives. The bar, *d*, slides at both ends along the inclined planes, *f*, and is adjusted by this motion in proper proximity to the cutters by means of the set screws, *g*; a spring being interposed between the screw and the bar in order to allow the knives to yield in case of encountering any hard substance, as a nail, and thus avoid breaking the machine. This adjustment is one of the novel features of the invention, and the other consists in the employment of the conductor, *h*, Fig. 2, for regulating the supply of rags to the cutters. This is attached to the bar, *d*, in the inside of the drum, as shown. The rags are introduced through the door, J, and while the machine is in operation the hollow trunnion is closed by the plate, K, which is made to fit into it. The motions are effected by ordinary mechanical devices.

Fig. 1




STORM'S IMPROVED RAG-PICKER.

Fig. 2




The patent for this invention was obtained, through the Scientific American Patent Agency, Feb. 14, 1860, and persons desiring further information in relation to it will please address the inventor, Joseph Storm, at Woonsocket, R. I.

## OUR MEASURES.

We hope Congress will not forget to devote attention to the reforming of our laws relating to weights and measures. So far as it relates to lineal measures, we hope our mathematical instrument-makers will take the *measure* into their own hands in a scientific manner, and adopt the "centessimal rule," either with or without any Congressional action.

A carpenter's rule is divided into 96 parts for a foot. The decimal division would make it contain 100. At present 144 square inches make a square foot; decimally, 100 square inches would make a square foot. At present, 1,728 inches make a cubic foot; decimally, 1,000 inches would better answer the same purpose. At present there is no easily ascertained value between a square foot and a square inch; but decimally, if a square foot costs one dollar, a square inch costs one cent. If a cubic foot costs one dollar, a cubic inch costs one mill. If the foot be divided into 10 inches instead of 12, the computation of inches becomes a mere child's play. For instance: Here is a box measuring 2 feet 5 inches long, 3 feet 7 inches high, and 4 feet 9 inches wide; what are the solid contents? Now, let any one multiply together these three dimensions, in the old way, covering the slate with figures, noting the difficulty and length of the operation, and then compare it with the simple problem, which would stand, reckoning 10 inches to the foot, as follows: $2.5 \times 3.7 \times 4.9 = 45.325$ feet. The multiplication of feet and inches would become as simple as the multiplication of dollars and cents. Such measures have been conveniently used by surveyors, and they have been lately adopted in some English machine shops.

**DISCOVERY OF A NEW PLANET BETWEEN MERCURY AND THE SUN.**—As we have referred to a photographic method by means of which the existence of a planet between Mercury and the Sun might be ascertained, our readers may perhaps be glad to learn that the discovery that such planet does exist has been made by Dr. l'Escarbeaut, of Orgeres, a small town in France. The existence of this planet was assumed by M. Leverrier, the distinguished chief of the Imperial Observatory at Paris, from the perturbations in the movement of Mercury, and his calculations have been verified by the observations of the amateur astronomer whose name we have given above. From the flood of light in which the planet revolves, it is difficult to ascertain anything very precise with respect to its dimensions, and so forth; but there is little doubt---the fact of its existence being established---that our able astronomers at the Royal Observatory, and elsewhere, will, before long, gives us some better account of it than which we at present possess. —*Photographic News.*

**NEW BUILDING STONE.**—A good sand or freestone, easily worked, of a favorable color, and possessing strength and durability, is very desirable for building purposes in our cities. There are very few sandstones that are suitable for the construction of houses; Connecticut, New Jersey, and New Brunswick furnish all that are used in New York. None of these equal granite or Westchester marble in strength and durability, but they are much cheaper. Last week we examined a very beautiful specimen of building sandstone, obtained in the township of Esqueesing, C. W. It exists in a mountain in four-feet layers, and the formation is at least 250 feet deep, and can be easily quarried. It is of a very soft drab color, is said to be very durable, and can be laid down in this city for 35 cents per cubic foot. The quarry is not far from the Grand Trunk Railway, and is, by land and water, distant about 489 miles from New York.

**CUTTING GLASS.**—Alex. Taylor writes as follows to the *Photographic News*:—"In treating of glass, I may give you another way of cutting bottles, shades or any glass vessel the neat thing you wish, and that is to get a rod of iron heated to redness, and having filled your vessel the exact hight you wish it to be cut, with oil of any kind, you proceed to very gradually dip the red-hot iron into the oil, which, heating all along the surface, suddenly the glass chips and cracks right round, when you can lift off the upper portion clean by the surface of the oil. This never fails, and many a couple of serviceable bell glasses have I made in this way from a six-pound confection bottle. If the above is suitable, it is at the service of your readers, and forms only an installment of hints which one photographer could give to another."

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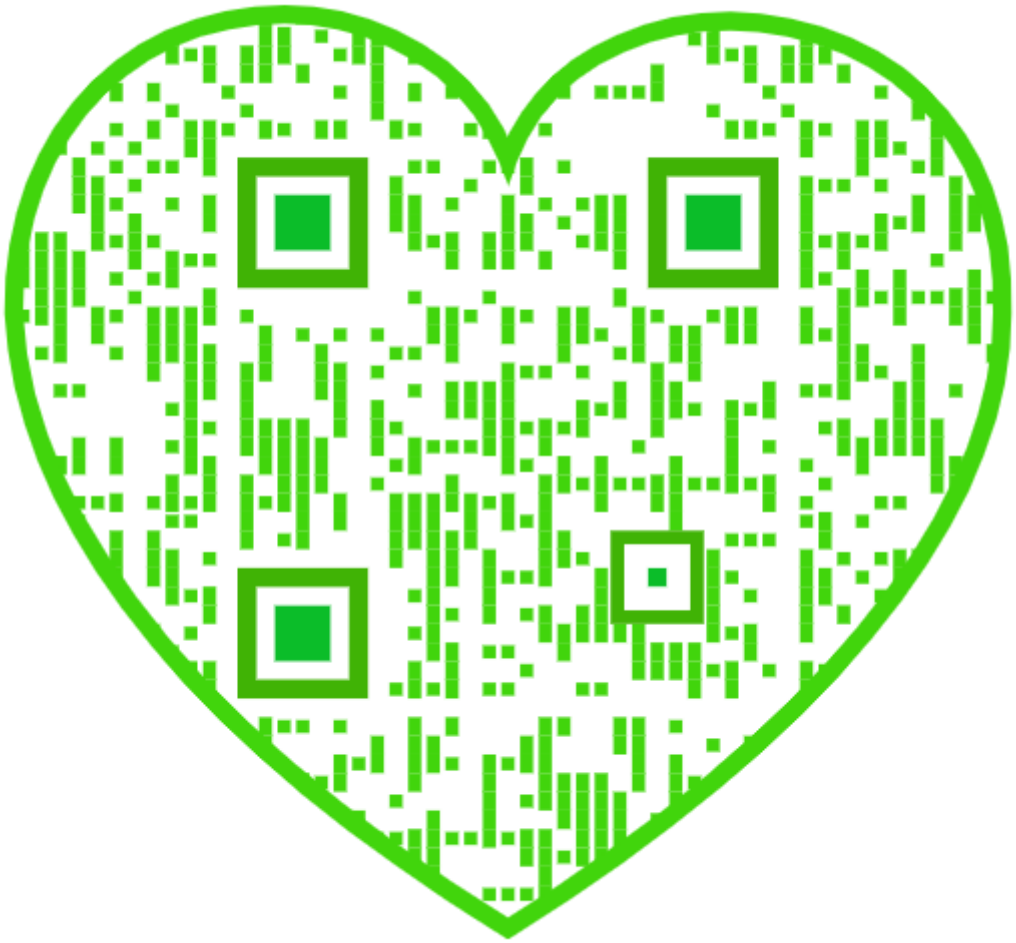

## THE OBSTRUCTION TO THE NAVIGATION OF RIVERS CAUSED BY THE PIERS OF BRIDGES.

BY J. W. SPRAGUE.

About a year ago, I was called on to survey a portion of one of the largest navigable rivers in the United States, in the immediate vicinity of a bridge, which had been erected over it. The object of this survey was to determine how much the navigation of the river had been obstructed by the piers of the bridge; and to procure data for testing the accuracy of the calculations of those engineers who had preceded me. A suit, of the nature of an injunction, was pending against the bridge. The affidavits, already taken in the case, were submitted to me, when I was surprised to find the singular errors into which some of the engineers (whose high professional position entitled their opinions to command the respect of all) had been led, by seeking to apply the formulæ of the books to a case to which they were totally inapplicable. All must admire the accurate precision with which a mathematical formula points out the steps that are to be pursued to arrive at the desired result; but experience has satisfied me that it is rarely safe to trust a formula to the hands of any one who, either from want of time or lack of ability, cannot first *retrace* the steps by means of which that formula has been drawn from well-known data. So rarely do bodies in the physical world present themselves to our notice under *precisely* the same circumstances as those assumed in the data from which the formula is deduced, that it is almost always necessary to make some allowance for the change in the condition of things. He who attempts to make such corrections, without a thorough understanding of the formula he is using, gropes in the dark, equally inclined to wander further from the right path or to stumble back into it.

In the case alluded to, the formulæ of the books were based upon the supposition that the line of the piers was parallel to the line of the current of the river. A survey of the premises indicated a considerable angle between the line of the piers and the line of the current. The formulæ of the books were used, but whatever corrections were applied carried the result further from the truth than would the simple formulæ. Even where the case that presents itself to us corresponds exactly with the one from which the formulæ are derived, there is liability to error, from not *entering* the formulæ with the correct units of time, space, or weight. Some formulæ require all distances to be expressed in inches, others in feet. After a formula has been developed, upon the supposition that an inch is the linear unit, we cannot always afterwards change that unit to a foot, without a complete revision of the formula.

The preceding remarks will, I trust, be deemed a sufficient apology for introducing to the readers of the SCIENTIFIC AMERICAN, a series of articles on "The Obstruction to the Navigation of Rivers caused by the Piers of Bridges," in which a simple method will be pointed out, by means of which the increase in the velocity of the current, and the hight of *remou* or back-water produced, can be determined with a considerable degree of accuracy by any engineer understanding the first prinples of his profession. Perfect accuracy, however, is unattainable by any process. It is also proposed to discuss the additional power required to carry a steamboat up through the draw of a bridge over that required for plain steaming. Not to perplex the student with too many refinements of processes at the outset, some statements will be made as if they were strictly correct; and afterwards modifications will be pointed out. Unless expressly stated to the contrary, it will be understood that the line of the piers is parallel with the line of the current.

Suppose, at a certain stage of water, the cross section of the water prism of a river, just above the pier, to be 10,000 square feet, and the sum of the greatest cross sections of the immersed portions of the piers and abutments to be 1,000 square feet; how much greater velocity will the water have between the piers than above them? The contracted water-way will be 9,000 square feet; and as the same amount of water must pass each second through the 9,000 square feet as though the 10,000 square feet of uncontracted water-way, it is evident that the velocities at the two points must be to each other inversely as the areas, or that the increased velocity is to the original velocity, as 10,000 is to 9,000, or as 10 to 9. This would give the *increased* velocity 10-9ths of the original velocity, and the *increase* of velocity 1-9th of the original velocity. As a rule, then:—*Divide the uncontracted water-way by the contracted water-way; the quotient, less unity, will give the relative increase of the original velocity caused by the piers.*

To test the accuracy of the above rule, take any velocity, say 18 feet per second, as the original velocity. The *increase* of velocity would be 1-9th of 18 feet or 2 feet, and the *increased* velocity 20 feet per second. The number of *cubic* feet of water, discharged through any area per second, is evidently equal to the product of the *square* feet of the area opening, multiplied by the velocity in *lineal* feet per second, with which the water flows through the opening. The quantity of water discharged per second through the contracted water-way will be 9,000 square feet × 20 lineal feet = 180,000 cubic feet. The quantity of water discharged per second through the unconstructed water-way will be 10,000 square feet × 18 lineal feet = 180,000 cubic feet. The products being the same in both cases, as evidently they ought to be, proves the accuracy, both of the rule, and of the operation performed under the rule. In practice, it is always advisable for the engineer to apply such tests, since there he will seldom find ratios so simple as those here chosen.

The rule given above seems to derive itself from almost self-evident propositions, yet in the case already alluded to, almost every engineer was led into error on this point, probably by such reasoning as this:—If the uncontracted water-way is 10,000 square feet, and the obstruction is 1,000 square feet, then the obstruction is 10 per cent of the whole water-way, and requires an increase of 10 per cent, or 1-10th of the original velocity, to carry the water through the piers. This fallacy, stated in the form of a rule would read:—Any per-centage of obstruction to the water-way causes the same per-centage of increase of velocity. To show the absurdity of this, take a case where 50 per cent, or half of the water-way is obstructed. The rule would give an increase of 50 per cent to the original velocity; but it is evident, that if we would force the same quantity of water per second through half of any space, we must give the water *twice* the velocity that would be required, if the whole space was free. Doubling the velocity is giving it an increase of 100 per cent, not of 50 per cent, as shown by the rule. Yet again: suppose the whole water-way, or 100 per cent, obstructed; then, according to the rule, the velocity would be increased 100 per cent, or doubled; and we should have the peculiar phenomenon of a river discharging itself through no space at all, by merely doubling its velocity. The correct rule, already stated, would give for such a case an *infinite* velocity, indicating an absurdity in the proposition. The reason why these absurdities did not discover themselves to the parties in question was, that the per-centage of obstruction being only about 1-10th of the whole water-way, the error would not show itself without some calculation.

I will close the first article of this series, by giving the test applied to the calculations of one of the most distinguished engineers in the country. I speak of him as such, in order to show, conclusively, how liable *all* are to fall into error. The data are those given by him; I have only combined them in such a way as to produce what may be called a *reductio ad absurdum*:—

| | |
|---|---|
| Uncontracted water-way | 19,383 sq. ft. |
| Obstruction caused by piers, &c. (about 8½ per cent.) | 1,667 " |
| Contracted water-way | 17,716 " |
| Velocity in uncontracted water-way | 6.74 per sec. |
| Velocity in contracted water-way | 7⅓ " |
| Water discharged per second through uncontracted water-way, 19,383×6.74= | 130,641 cu. ft. |
| Water discharged per second through contracted water-way, 17,716×7⅓= | 129,858 " |
| Error of calculation, as shown by quantity of water accumulating each second above the bridge | 783 cu. ft. |

Adding 8½ per cent to 6.74 gives 7⅓, showing conclusively how the result was arrived at, and how the error crept in. The real error was, however, much greater than that indicated above, as will be evident further on, when certain necessary modifications are introduced.

[To be continued.]

ALL the rivets of the British iron ships are to be covered with cement, to prevent the action of bilge water.

## THE LIME LIGHT.

Some recent improvements in the calcium light have been made in England, which are attracting a great deal of attention. The London *Journal of Gas Lighting* contains a long article on the subject, from which we make the following extracts:—

A light of great brilliancy was, some years ago, produced by combining a large volume of oxygen gas with a congeries of argand or other burners, supplied with oil, and known as the "Bude Light," but, like others, it was finally rejected, as disadvantageous in practice. For many years—even as far back as 1820—attempts were made to obtain a safe and intense light by the ignition or combustion of a ball of lime, in the united flames of hydrogen and oxygen gases. It was employed for microscopic purposes, and is stated to be equal to about 264 flames of an ordinary argand lamp (consuming the best spermaceti oil), each of which is equivalent to ten wax candles of four to the pound.

About the year 1826, Lieutenant Drummond, who was appointed to conduct the ordnance survey in Ireland and Scotland, first applied the lime light in the focus of a paraboloid, on lofty eminences, where the stations were usually placed, as it was of great importance in those operations to have certain and determinate signals, which could, almost under any circumstances of the weather, be seen at great distances; and by it he successfully connected the opposite shores of Ireland and England at or about Holyhead—a distance of about 64 *miles*. He used, on some of those occasions, oxygen gas, and alcoholic vapor, but ultimately substituted hydrogen gas for the latter. In Scotland he obtained a most successful result on the summits of Ben Lomond and Knock Layd—a distance of 95 *miles*, thus demonstrating the practicability of adopting the lime light for long distances.

It was found by Drummond that many substances were capable of producing light in conjunction with gases, but that, of all those which were available for the perfect combustion of the gases, chalk lime was the most suitable material for the purpose, and hence the name of "Lime Light." It was also the cheapest and most easily attainable in any locality. It was likewise found that several gases, compounds of hydrogen, might be successfully employed in combination with oxygen gas, as well as pure hydrogen. Pure hydrogen gas, obtained from zinc and diluted sulphuric acid, offers facilities in cases where carbureted hydrogen, as supplied by the gas-works, cannot be readily procured; but coal-gas, where available, is a most desirable substitute for the ordinary applications of the light.

The generation of oxygen gas, which plays so important a part in the production of this light, is one of extreme simplicity. It is obtained cheaply and easily from a variety of substances, each existing in great abundance, viz., peroxyd of manganese (black oxyd), chlorate of potassa, nitrate of potassa (familiarly known as saltpeter), and some other substances, the employment of which for this purpose is, however, precluded by their cost, as oxyd of lead and red oxyd of mercury; but it is probable that these will yield a residuum as the other substances, which residuum will become an article of ready and remunerative sale, by which the cost of the gas produced from them will be reduced to a mere nominal value.

The peroxyd of manganese requires simply to be placed in a retort raised to a red heat, when the oxygen gas is freely disengaged. So soon as the gas ceases to be evolved from the manganese (which can only be effected practically to the extent of about 11 per cent, although it contains at times 80 per cent), the residuum, the deutoxyd or sesquioxyd of manganese, may be drawn from the retort; and if thrown into water, or exposed at a high temperature to the action of the atmosphere, it will attract oxygen with great avidity, and thus this refuse becomes revivified, or resumes its former state of a peroxyd, fitting it by this operation for a repetition of the distillatory process. This peculiar property of the deutoxyd of manganese (of rapidly absorbing oxygen from the surrounding air or other oxygenated bodies brought into contact with it) gives to this substance a great commercial value as a material for producing oxygen gas; for since the actual consumption of the manganese is thus limited by the quantity necessary to provide for the supply of gas during the time required for the revivification of the exhausted material, a comparatively small stock only will be needed to compensate for the unavoidable waste consequent on this mode of operating upon it. In

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addition to this source of economy, the demand for the deutoxyd of manganese for chemical purposes in glass-making, bleaching, and other processes in the arts, presents a means by which the residuum may be disposed of at a price which will leave the cost of the gas merely nominal. Thousands of tuns are imported annually into this country, from the continent, for the before-named purposes, and hence the disposal of the residuum is a matter of certainty.

The chlorate of potassa is a substance which, though costly at first hand, is nevertheless a valuable material for the production of oxygen gas, from the facility which it affords to the operator. The comparatively low temperature needed for its disengagement and the rapidity with which it is produced require less attention and labor. Hence the cost of the gas is not so great as would at first sight appear, when contrasted with that from manganese. The residuum is chloride of potassium, or familiarly, muriate of potash, and is used in the arts.

The cost of the lime will, under proper arrangements, be extremely small; the cost per hour for each jet may be taken at ·03 of a penny.

Having thus shown the modes of obtaining the elements of the light, it now only remains to describe the improved form of the instrument in which they are utilized, with some of the many important applications which are contemplated by the Lime Light Company. A patent was taken out in this country, in 1858, for "Improvements in apparatus employed in the production of light," by Mr. J. H. Bastable (a communication); and subsequently a patent for additional improvements was obtained (in 1859) by Mr. Prosser. The object of these patents is to remedy the defects of the former applications of the lime light. It has been invariably found that, although for short periods, for microscopes, and similar comparatively minor applications of the light, the adopted methods of applying the lime were, with great care, sufficient for the purpose, yet for the general purpose of lighting, the means were totally inadequate to the object; as the lime, when exposed to the action of the heat produced by the combustion of the gases or the influence of the atmosphere, unavoidably became cracked or decrepitated, and in this ruptured state, having no support, fell away from the jet of flame, and either rendered the light inconstant or entirely useless; for the ignited gases, without the presence of the lime, possess no illuminating power whatsoever, though they are in that state most powerful agents for the destructive separation of refractory substances.

To effect the desired object of protecting the lime from crumbling away and of insuring a practically unlimited supply, the simple expedient of enclosing the lime in a case or guard, both above and below the point of ignition, was resorted to, exposing only such a portion of its surface as was required for the action of the gases; and by giving to the lime so enclosed a movement within the tube, the retention of the ruptured portions of the lime was insured, until, by simple means, they were allowed to escape without detriment to the light, or were replaced by a fresh supply in as simple a manner as the cotton wick of an argand lamp, thus effecting, with the perfect continuity of the light for any reasonable period (a fortnight or more if necessary) of time, the maximum brilliancy of the light.

So simple are the mechanical appliances for producing these results, that they fall as much within the compass of the ordinary attention bestowed on such objects as that required for an ordinary lamp.

The extreme purity of the light eminently adapts it for interior illumination, as there is no evolution of deleterious gases or fumes (which from gas, are so destructive to works of art, as pictures, furniture and costly embellishments); nor any abstraction of the oxygen from the atmosphere, the requisite quantity for combustion being supplied by the instrument itself.

The light can be used either as a naked light, or in combination with the catoptric, dioptric, or the catadioptric systems, for lighthouses and ships of every class; for railroad stations and signals, both fixed and movable; for floating-light vessels or buoys in navigable channels; for bridges, wharfs, public buildings, factories, squares, and large and important thoroughfares; and by a judicious and compact arrangement of apparatus, its introduction into the interior of mansions where gas has not hitherto found access will doubtless be insured. The application to street lighting, from its extensive and important character, has been reserved for the serious consideration of the company, who have, however, so far matured their plans as to justify their anticipations of complete success.

## BORACIC ACID IN THE PACIFIC.

In San Francisco there is an Academy of Natural Sciences, which has some very able and prominent members. At one of its recent meetings, a paper was read on the above subject by Dr. John A. Veatch, in which he stated that the fact of boracic acid being in the sea water along their coast was brought to his attention in 1857. Prior to that period he had discovered the borate of soda in the water of a mineral spring at the upper end of the Sacramento Valley, and he had found borates in nearly all the mineral springs of California. Borate of soda was so abundant in one particular locality that enormous crystals of that salt were formed at the bottom of a shallow lake, or rather marsh, one or two hundred acres in extent. The crystals were hexehedral with beveled or replaced edges, and truncated angles; attaining the size, in some cases, of four inches in length by two in diameter, forming splendid and attractive specimens. In the same neighborhood, a cluster of small thermal springs were observed holding free boracic acid in solution. A few hundred yards from these a great number of hot springs of a temperature of 212° F., rose up through the fissures of a silicious rock. These springs held a considerable quantity of borax, as well as free boracic acid. Many other localities furnished similar indications, but in a less extensive form.

"In progress of examination," says Dr. Veatch, "I found that the common salt (chloride of sodium) exposed for sale at the San Francisco market; and which, it was understood, came from certain deposits of that article on the sea margin in the southern part of the State, also furnished boracic acid. I was led to attribute it to the fact of mineral springs emptying into the lagoons furnishing the salt. It was, therefore, a matter of no small surprise, when on a visit to the localities, I found no trace of acid in any of the springs in the adjacent district. This led to an examination of the sea water, and a detection of an appreciable quantity of boracic acid therein. It was at Santa Barbara where I first detected it, and subsequently at various points, from San Diego to the Straits of Fuca. It seems to be in the form of borate of soda, and perhaps of lime. The quantity diminishes toward the North. It is barely perceptible in specimens of water brought from beyond Oregon, and seems to reach its maximum near San Diego. This peculiarity seems to extend no great distance seaward. Water taken thirty or forty miles west from San Francisco gave no trace of acid. In twelve specimens taken at various points between this port and the Sandwich Islands, furnished me by Mr. Gulich, of Honolulu, only that noarest our coast gave boracic acid. In ten specimens furnished me by Dr. W. O. Ayres, taken up by Dr. J. D. B. Stillman, in a trip of one of the Pacific mail steamers from Panama to this place, no acid was observed south of the Cortez Shoals."

## AMERICAN MACHINERY FOR THE AMOOR RIVER.

We saw, last Monday, at pier No. 11 North river, in this city, one of J. C. Hoadley's portable steam engines on its way to Mantchooria. Mr. Hoadley received a letter from the Novelty Works in this city, on Saturday, Feb. 18th, ordering the engine on condition that it could be in this city on Tuesday, March 6th. As it would require to be finished on Thursday, March 1st, at his shop in Lawrence, Mass., this gave Mr. H. less than two weeks to do the work. He however accepted the order at once, and immediately took his horse and visited his workmen, to have them on hand early on Monday morning; and as a carriage for this particular engine required some peculiarly heavy seasoned plank, he telegraphed in various directions to learn where this might be procured. The man who made the axles was induced to run his shop on the holiday of Feb. 22d, and by this energy the engine was landed in this city one day before the specified time, all finished in the most thorough and substantial manner, with everything necessary to its operation in the wilderness to which it is to be transported, more than 15,000 miles away.

We understand that this engine is intended to drive one of Parkhurst's saw mills, and is to fill part of a large order for machinery which the Novelty Works had received from a Russian now in this city, who intends to take it to the Amoor, in the north east corner of Asia, where he expects to sell it to the Russian government.

It is the same style of engine as the one mentioned by us in the notices of the fair of the American Institute last Fall. Mr. Hoadley tells us that that notice, occupying perhaps two inches in one of our columns, brought him more than 50 letters. Considering that the prices of his engines range from $300 to $2,300 and that consequently these 50 letters relate to the purchase of some $50,000 worth of property, this affords a striking proof of the influence of our paper.

## CURING SMOKY CHIMNEYS

MESSRS. EDITORS:—I wish to notice an answer which you gave to C. Q. L., of Mo., on page 110 of the present volume of the SCIENTIFIC AMERICAN, where you say "the higher the chimney, the better the draft." That theory will not always hold good in practice. In fact, I have noticed some chimneys that smoked worse, if possible, by being built higher. My theory is: the higher the chimney—if properly built, and of the right size—the better the draft. As an illustration of the above, I will state a fact that occurred a few years ago, while I was engaged in chimney-building. A gentleman came to me, and said he had two chimneys (on the two wings of his house) that smoked very badly. They were 11 feet high above the roof; and on one of them he had tried a stove-pipe 10 feet long, with a cap on top to turn with the wind, yet it smoked worse than before. He now wished them "laid over," or fixed so as to prevent smoking, but would not have the job done unless warranted to cure. I undertook the job. The size of the chimneys was 20 by 32 inches on the inside. I took them down only to the roof, and commenced laying them up, drawing in gradually till the size was reduced to 4 by 12 inches on the inside; then carried them up straight to within 18 inches of the top; then laid out again, in laying on three courses of brick, to increase the size to 8 by 16 inches on the inside; then drew in on three courses, back to the size of 4 by 12 inches, and laid another course perpendicular to the last; the whole hight being only five feet above the roof. Neither of those chimneys has ever smoked since that time—a period of eleven years.

Munnsville, N. Y., Feb. 25, 1860. L. L. G.

[The question of "curing smoky chimneys," and the *draft* of chimneys are not the same exactly in a scientific point of view. A chimney may smoke—that is, may have a deficient draft, owing to the situation of the house on which it is placed; and by increasing its hight, the evil may only be aggravated, as our correspondent has justly observed. We have known several cases of this kind. The houses were situated where whirls of wind forced the smoke down the chimneys. The latter must be constructed according to circumstances, and the practical information which our correspondent has furnished is very valuable; still it is true as a principle that "the higher the chimney, the better the draft," and it is upon this theory that all the tall chimneys for factories are constructed.—EDS.

## TENEMENT HOUSES—A GOOD IDEA.

MESSRS. EDITORS:—I beg leave to suggest a simple, sure, durable, cheap and easy fire-escape for tenement houses. Such houses are generally from 20 to 30 feet higher than the adjoining houses. Let an iron ladder be permanently annexed to the side wall of the tenement house, thus connecting the roof of the tenement house with the roof of the adjoining house. In case of fire, the inmates occupying rooms below the origin of the fire, may escape by decending the common stairs, those occupying rooms above the origin of the fire may escape by ascending the common stairs to the roof, and making use of the iron ladder to reach the roof of the adjoining house. Thus all will be saved. Such an iron ladder would cost from ten to twenty dollars, according to the length. No landlord would (at the request of one respectable tenant) refuse to furnish it. No tenant of a tenement house should neglect to demand it. But I trust that this communication will arrest the attention of some member of the legislature, who, appreciating the effectual and wholly unobjectionable character of this improvement, will procure the enactment of a law requiring its adoption for all tenement houses.

J. A. D.

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## IMPROVED SAW SET.

The annexed cut illustrates an implement for setting the teeth of saws, invented by Lebbeus Brooks, (deceased) and patented by Olive Ann Brooks, administratrix of his estate. The principal feature of the invention is the connection of the jaws without the use of a fulcrum pin.

The saw is placed between the jaw, *c*, and the end of the screw, *b*, which passes through the jaw, *d*, with the end of the teeth against the adjustable guide, *a*. The jaw, *c*, being rigidly attached to the upper handle, A, and the jaw, *d*, to the lower handle, B, by pressing these handles together the saw is rolled upward and the tooth bent. The projections in one jaw correspond to recesses in the other, and the boundaries of these are curves about a common center, permitting the motions of opening and closing the jaws. The two parts are fastened together by means of a screw and washer, *c*, the washer lapping over the edge of the jaw, *c*, and the screw entering the jaw, *d*.

Fig. 1

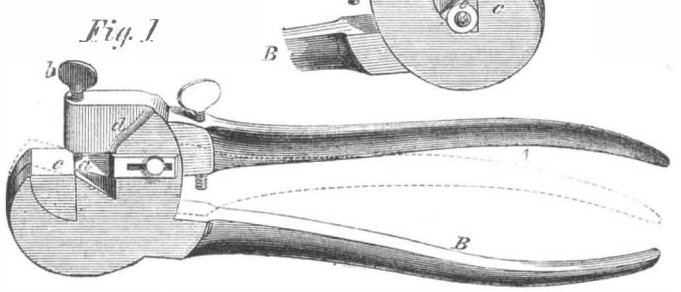
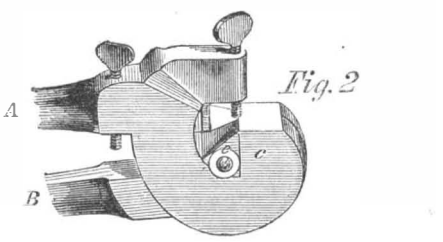



Fig. 2




The patent for this invention was issued March 29, 1859, and persons desiring further information in relation to it will please address Messrs. Clark & Wilson, 81 Beekman-street, this city, or the Great Falls Saw Set Company, Great Falls, N. Y.

## CLEANING STEAM BOILERS.

MESSRS. EDITORS:—Having been a constant reader of the SCIENTIFIC AMERICAN, I have noticed several articles relative to the incrustation of boilers and the method for preventing or removing the same. Being an engineer myself I, of course, have had to contend with the same difficulty, and have used a number of articles, such as potatoes, potash and rye, but have as yet found nothing so beneficial as common molasses. In using it I have taken some convenient time when I could blow out a few hours after having raised steam, and previous to admitting water to the boiler, I would send in one of the firemen with a quantity of the article and a common swab made of rags, with which he would thoroughly coat the flues and sides of the boiler with the molasses. Afterwards I would raise steam and run from six to eight hours, then blow down, and, besides the scale that I would find already detached from the boiler, I could, with a common pick, remove that which had before resisted the hardest blow. In a boiler 30 feet long and 42 inches diameter, I have, in one trial, removed upwards of half a bushel of scale. J. L. L.

Dubuque, Iowa, March 7, 1860.

AN IMPROVEMENT ON THE CALORIC ENGINE.—Mr. Henry M. Paine, of Worcester, Mass., somewhat famous a few years ago for water-gas experiments, now claims (so says an exchange) to have perfected an engine, to be operated by heated air, which puts Ericsson's affair entirely in the shade—as the same power can be obtained, he says, with one-seventh the quantity of fuel. His improvement is represented to be based upon the asserted fact that "air which has been impregnated with a certain amount of moisture in the shape of vapor, will readily expand by the application of heat, to seven times the bulk which the same volume of dry or common air attains with the same degree of temperature."

Oh Mr. Paine! Mr. Paine! why will you keep astonishing the world with your discoveries, and then disappoint everybody by letting them end in mere *gas*.

WATER WHEELS AND PRINTING PRESSES.— The Lynchburgh *Virginian* is printed on an Adams press which is driven by a small water wheel, under a high head, with only an inch discharge pipe. The water is conveyed from an elevated reservoir by a pipe, and it passes out into the sewer of the street, after having operated the wheel. This is a most simple mode of driving small presses in places where a considerable head of water may be obtained. In Newcastle, England, and in Stirling, Scotland, two weekly newspapers are printed on presses driven by small water engines, but a small turbine wheel is about the best form of a water motor that can be used.

## CUTTING FILES BY MACHINERY.

MESSRS. EDITORS:—Being a constant reader of your valuable paper, I recently read (in your issue of the 11th ult.) a notice of files made at Ballard Vale, Mass. Presuming you wish to know of all new and valuable improvements, I send the following brief account of the method and progress of making files by the Whipple File Company, at the above place:—

The company has been in existence about two years, with Hon. Alfred Kittredge, of Haverhill, as president; and is now running six machines (or two "sets") for the flat file, and one for cutting round files. These files have been in use in this vicinity for more than a year, and have given entire satisfaction—*vide* the testimonials in Boston papers. In fact, the "proof of all proofs" is in their favor, as they sell as fast as they can be made, and at the same price that the English (or hand-cut) files are sold. By this manner of cutting files (which is by a rotary cutter attached to a vibrating bar or slide) the difficulties of all former trials are obviated. The file is set or fixed by its tang into a socket; and it is fed up by means of gears and ratchet. By this method of holding the file, the old way of using lead is done away with; as, by this machine, no chisel or blow is used to make the tooth. These cutters are three or four inches in diameter, and three-eighths of an inch thick; and experience, so far, has led to the conclusion that they will do their work for one week without being sharpened; a few moments only being necessary to change them. By using these cutters, the trouble of keeping the edge of a chisel in the proper order to catch the steel for the succeeding tooth is saved. This peculiar edge of the chisel used by hand-workmen is a necessary point to them, and is the reason of their so often needing to be honed or sharpened. By using the rotary cutter, it is easily seen that the force necessary to cut the tooth is used only as the cutter travels across the blank, as it acts like rotary shears; while, by using a chisel of the width of the blank, a powerful blow is necessary to displace a sufficient amount of steel to form the tooth, thereby deranging or altering the position of the blank at each blow. This shows it to be almost impossible to adapt machinery to hold a blank in its place while being cut; and, furthermore, the blow must be adapted to the shape of the blank. The Whipple File Company gage the depth of the tooth from the face being cut, independently of the width or thickness of the blank. A "set" of machines (consisting of three) turns out or finishes two dozen in 30 minutes. By one man's labor, it is intended to produce from 25 to 30 dozen of 12-inch "bastard files" per diem of 10 hours; one man being employed to each set of machines, each machine cutting eight files; the three machines consequently cutting, at the same time, 24 files. The company are introducing improvements in all branches of the file business; and, by judicious management thus far, they give promise of future success.

M. D. W.

Boston, Mass., March 10, 1860.

## EXPERIMENTS IN CAST IRON.

A series of very valuable experiments have been carried on, under the management of Col. Eardley Wilmot, superintendent of the royal iron factories at Woolwich, England, with a view to determine the most suitable variety of cast iron for making cannon; and the results of these experiments have been lately printed in the form of a Parliamentary report. Information regarding the several brands of iron experimented with would be of little interest to our readers, but there is other information in it interesting to all who work in cast iron; and the substance of this we give as follows:—The general mean tensile strength of 850 specimens of cast iron was 23,257 lbs. on the inch: the transverse strength of 564 specimens was 7,102; while the crushing strength of 273 specimens was 91,061 lbs., and the torsion but 6,056.

It was found during these experiments that when the specific gravity of cast iron was 7.3, and upwards it was too hard, and did not possess sufficient elasticity for casting cannon. A marked superiority was the result in bars cast horizontally over those cast vertically. Bars which were cooled quickly were also much stronger than others cooled slowly.

It was also found that by repeated re-melting of the cast iron its quality was greatly improved. This effect, however, was not so marked when large masses of several tuns were operated upon at once. It is believed that by re-melting (although such impurities as phosphorus, sulphur and silica may not be expelled) some of the graphite in the iron is converted into combined carbon, which enables the contraction and crystallization of the metal to be more complete. But if the melted iron is allowed to cool very slowly, the carbon is re-converted into graphite, and the iron becomes soft. Repeated melting, then quick cooling, and horizontal casting, improve vastly cannon and all articles made of cast iron.

## EXPERIENCE IN TEMPERING MILL PICKS.

MESSRS. EDITORS:—I noticed on page 126 of the present volume of the SCIENTIFIC AMERICAN, in answer to a correspondent, a few remarks on tempering picks. Allow me to add my experience to your knowledge. In the first place, a good charcoal fire is necessary, next good steel, then a good light hammer, a good smooth-faced anvil, and a man with a good eye and judgment. A pick must never be upset or hammered endwise, nor raised above a red heat; it must be worked with care, and the last hammering given on the flat sides. When ready for hardening it must be heated in the blaze of a charcoal fire until red hot, then plunged into cold rain water until it is nearly cold. If it is kept in too long the corners will fly off; and if the water is not cold enough add ice, but no salts of any kind. With good steel and proper working, I have found no trouble to get picks hard enough with soft water, and those have always been more tough and have stood more work than any other. F. F. S.

Momence, Ill., March 5, 1850.

## OUR SHIPPING.

The total tunnage of our commercial navy amounts to 5,145,037, which is less by 97,291 than what it was in 1858. This is owing to the loss of a number of vessels and some which were condemned, together with 30,850 tuns sold to foreigners. During last year there were built—Ships and barks, 89; brigs, 28; schooners, 297; sloops and smaller craft, 284; steamers, 172: total number, 870. The depressed condition of the shipping interest has operated to decrease the demand for new ships, and the number built during the year has been less than for any former year since 1844. In the foreign trade there are 2,507,401 tuns of shipping engaged; in our coasting trade, 2,439,320 tuns; in cod and mackerel fishery, 147,546 tuns. We have 768,752 tuns of steam shipping. At present our ship-building business is very dull. An eminent ship-builder has expressed the opinion (to us) that if we wish to retain our foreign trade, we must go in for the construction of iron screw steamships. Our coasting trade has wonderfully increased of late years, owing principally to the acquisition of California. We should also seek to cultivate a more extended trade than we now possess with the South American ports.

THE PENNSYLVANIA OIL SPRINGS.—The continued yield of these springs and veins is creating much excitement in their vicinity and elsewhere, being calculated, as they are, to render that region of our country one of the richest in the Union. One gentleman at Union, Pa. (a Mr. Hall) recently commenced boring, and at the depth of 58 feet struck a vein, which is yielding him 12 barrels of oil per day. Others, from a greater depth, are securing 30 barrels per diem. It now becomes a question as to what the effect of these discoveries will be upon the whale fishery.—*Evening Post.*

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## MANUFACTURE AND USES OF STARCH.

[Concluded from page 167.]

If, instead of employing very minute quantities of acids mixed with water and starch, a large quantity is employed, the starches are not only transformed into gums, but converted into the kind of sugar which exists in grapes and other fruits. In the latter case, however, the starch undergoes not a mere molecular change, but a chemical transformation. On the continent of Europe large quantities of this peculiar sugar are employed in the preparation of beer and other beverages. This grape sugar is made as follows:—

About 100 parts of farina are added gradually to 33 of water containing one part of sulphuric acid, and then boiled for 40 minutes, when the farina is converted into grape sugar. When it is transformed into sugar a little chalk is added to destroy any free acid that may remain; this falls to the bottom in the form of sulphate of lime. The saccharine solution is then poured off and evaporated to a proper consistency. After cooling and standing for several days, solid masses of sugar, very similar in appearance to honey, are obtained. If, instead of continuing the boiling action of the acid upon the starch until it is fully converted into sugar, this action is stopped just as soon as it gives a purple color, when a little iodine is added, then by removing the acid by the use of chalk, as has been described, and evaporating the solution, a translucent soluble matter resembling dextrine is the product. That starch could be converted into dextrine has been long known, but it is only since 1833 that chemists have been aware how this conversion was effected. In that year Messrs. Payen and Persoz, of Paris, succeeded in extracting, with alcohol, from a solution of malt, the curious ferment which caused that change, and they gave it the name of *diastaste*. To leave no doubt that this is the agent which converts starch into sugar, they found that by mixing one part of this azotized substance with 2,000 parts of farina, and a sufficient quantity of water, the farina was completely converted, first into dextrine, then into sugar, at a temperature of 150° Fah. But whenever the temperature was raised to 200° or 212° Fah., this conversion was completely prevented. As a law of chemistry, therefore, brewers must not raise the heat of their mash-tubs above 150°, under the penalty of inflicting loss upon their own interests.

### CORN STARCH.

This being an exclusive American manufacture, we find nothing said about it in Dr. Calvert's lecture; we will therefore supply the omission with a brief description of the process. As corn contains considerable oil, it must be treated somewhat differently from wheat. It is therefore first soaked in the vats in a warm alkaline solution. Some manufacturers never permit fermentation to take place in soaking, to facilitate the separation of the starchy from the fibrous elements, while others allow fermentation to take place, as in the wheat starch manufacture. After this is properly effected (which requires from eight to fourteen days), the corn is ground between common grist millstones; from these it passes to rotary screens where it is washed with a stream of water, when the starch flows out through the meshes, and the grain hulls are left behind. The water containing the starch is then pumped into settling cisterns, and some dilute caustic alkali is added and all thoroughly stirred. The alkali causes the fibrous particles of the corn to separate from the starch and settle to the bottom. The starch liquid is then drawn off by siphons, into perforated wooden boxes lined with cotton cloth, from which the water gradually flows out and leaves the starch behind. Settling raffles (a series of inclined, narrow boxes connected with one another) are also used, and by the liquid running over an extensive rippling surface in these, more starch is thus deposited, upon the same principle that streams, in running over pebbly bottoms, deposit more mud and impurities than when flowing smoothly along. It is very remarkable that in the settling cisterns the starch exhibits polar attraction, that is, it gathers in bunches, as metallic oxyds aggregate in the act of crystallization; the localities being called "spheres of attraction."

There are vast quantities of starch manufactured in this country, but some of it is of very inferior quality. This is owing to the want of skill in the manufacturers. Good starch should not only be of a clear white appearance, but should so stiffen muslins that they will possess considerable elasticity. A linen collar, for example, when stiffened with good starch, will not, when folded over, crack and exhibit brittleness, but will exhibit a retractive force and endeavor to assume its original form. A great many manufacturers of corn starch, while they have succeeded in obtaining a product of a good appearance, have not succeeded in making it of a good stiff and elastic quality. There exists a prejudice against corn starch in the minds of bleachers, calico-printers, and cotton manufacturers who use large quantities of it; they believe it is not suitable for their purposes. There are some manufacturers who can make good corn starch, and the time may come when wheat starch will be as scarce as that made from rice, which is now only manufactured for dressing fine lace.

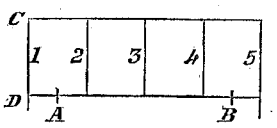
About ten years ago there was a great excitement caused by the supposed large profits obtained in the manufacture of all kinds of starch, and as a consequence a great number of companies were formed in various parts of the country; and starch factories sprung up like mushrooms. But owing to the want of skill and experience on the part of those chosen to conduct them, the greater number, of them soon failed, and one of them (in Buffalo, N. Y.) which for the building and machinery cost over $100,000, was sold a few weeks since for $15,000. To conduct the starch manufacture profitably, about 23 pounds should be obtained from a bushel of grain, but owing to a want of knowledge of the fermenting process, many manufacturers fall a very long way below this produce. They permit vinous fermentation to take the place of the acetous, and considerable of the starch is thus converted into dextrine and passes off as waste. It requires a very critical knowledge of fermentation to conduct the corn starch manufacture successfully.

## IRON BEAMS FOR DRILL ROOMS.

Messrs. Editors:—I have just read, with considerable interest, and in at least two particulars, considerable satisfaction, the article published on page 121 of the present volume of the Scientific American, on the "Strength of Wrought Iron Beams." In your opening remarks I fully concur; and the conclusion to which you come (that different authors have guessed too much) I fear is but too true.

As no answer has been given to the question published on page 74 of your journal, I have concluded to try it, with the formula which you say "is preferable for all purposes." The question had reference to a room filled with soldiers, in motion; while the given figures (on page 74) allow "a space of 3 feet between the ranks, and 2 feet *between each man*. I hold that marching with "lock step," as some soldiers call it, the space occupied by each does not exceed 1 by 2 feet; making 70 lbs. per square foot, allowing 140 lbs. for each man—a trifle over the 66 lbs. per square foot stated (on page 121) to be the "weight of a crowd of persons standing on their feet."

By the aid of a few lines (see diagram), and not a great many figures, we obtain the following:—




We will take only a portion of the floor, as less figures will be needed. Let the lines numbered 1, 2, 3, 4 and 5 represent beams placed 4 feet apart; the points A and B being central between 1 and 2, and 4 and 5, the distance from A to B will consequently be 12 feet. The length (or distance) between supports (from C to D) is 17 feet. Then $12 \times 17 = 204$ square feet $\times 70$ lbs. per square foot, for the soldiers = 14,280 lbs. $\times 4$, for "momentum on the floor per second, marching at the rate of 3 miles per hour" (rather slow, in imitating a retreat) = 57,120 lbs. Weight of arching, concrete, &c., 75 lbs. per square foot $\times 204 = 15,300 + 57,120 = 72,420$ lbs., which is the total weight to be supported by the three beams, Nos. 2, 3 and 4. By the formula on page 74, the "breaking weight" of each beam, "with the load uniformly distributed," is 42,254, which $\times 3 = 126,762$. We now have as the result; breaking weight = 126,762 lbs.; load, 72,420 lbs.; or, in other words, a load of 9,039 lbs. more than half the ultimate strength of the beam; laying aside the "dangerous vibratory motion which accumulates the tensile strain."

As you say you "will not let the subject sleep hereafter," will you, or some other friend of science, answer the following question: would it be prudent and perfectly safe to use—as a drill room—a floor, &c., as described on page 74 of your journal, with beams 4 feet apart?

New York, March 7, 1860. Inquirer.

Another correspondent sends us the following on this subject:—

Messrs. Editors:—I wish to know why it is proposed to use 9-inch beams in the floor of drill room, as they might as well be made of the brick and concrete work—13 inches. I always like to give as much depth to beams as the floor and space will permit, as the strain is less and the stability greater according as the depth is increased—two very important points in a drill room. I could show very serious objections to the use of 9-inch beams for such a purpose. I gave a rule for calculating the strain in beams at the middle, which was published in Vol. XIV. (old series) of the Scientific American. It is this:—When the load is concentrated on the middle then multiply its weight by $\frac{1}{4}$ of the span, and divide the product by the depth of the beam, and the quotient will be the horizontal strain in each of the (upper and lower) chords. When the load is uniform, take $\frac{1}{2}$ of it, and proceed with it as with the first. This is the same as calculating the power of a bent lever, and I have proved its truth by actual trial. Or thus:—Let the span be represented by S, weight by W, depth by $d$, and horizontal strain by H. Then $W \times \frac{1}{4} S \div d = H$. I do not offer this as new, but I regard it as the most simple, and I know it to be true. This gives the strain in the *middle* of the beam; and I stated in the above-mentioned volume that it is *nothing* at the *ends* of the upper chord, when it is straight and parallel with the lower chord. If the makers of such should be required to give the pressure at different points between the middle and ends of a straight chord, they would find reasons for abandoning such forms. B. S.

Baltimore, Md., March 1, 1860.

We are of opinion that it would not be prudent to use a drill room having its beams constructed and arranged as described. They should be capable of standing five times the amount of strain to which they will be usually subjected. Unless they are well constructed, iron beams are exceedingly treacherous when subjected to vibrating action. We have seen bars of the very best quality of steel broken by striking a few rapid blows with them upon an anvil, while a bar of hickory of the same length and thickness, and subjected to the same vibrations, was not the least affected in its strength. Crystallization (and consequent brittleness) was produced in the steel with a rapidity that surprised us. In the broken surfaces the progress of the crystallization from the outside to the center was very clearly defined.

Small-Pox—Gas a Disinfectant.—In St. Johns, New Brunswick, there are many cases of small-pox under treatment, but there is no house in the city where gas is burned, of the ordinary consumption, in which the disease has yet found lodgment. The gas, it is supposed, is a powerful disinfectant, and hence there is no contagion within the circle of its influence. Is is stated that a person burning gas may contract the disease abroad and take it home with him, but it will not be communicated to any other member of his family.

[We copy the above paragraph, which is going the rounds of the papers, for the purpose of disputing the inference that gas will protect people from the small-pox. There is a person in our office who contracted this disease in a room where gas was burned very freely; the disease is also very prevalent in the city of Glasgow, where gas is very largely consumed. Small-pox is doubtless uncommon among that class of people who burn gas in our cities, because they generally have sufficient intelligence and forethought to attend to the vaccination of their families, and its ravages are almost wholly confined to that improvident class who make no provision against the small-pox, or anything else in the future, and who live by the light of burning fluid.

Orange County Milk.---New York City is dependent upon the adjacent agricultural districts for its supply of milk, and a vast amount of it is required for daily use. The above-named county had been distinguished for many years for its excellent butter; but since the facilities offered by railroads permit of the sweet milk being carried from a considerable distance daily, little butter is now made in comparison with the make of former years. Last year there were no less than 5,359,839 gallons collected at nine stations in Orange county, and sent down to the city on the Erie Railroad.

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## POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported expressly for the Scientific American.]

On Tuesday evening, the 28th ult., the usual weekly meeting of the Polytechnic Association was held at its room in the Cooper Institute, this city; the chairman being Dr. R. Stevens, and John Johnson, Esq., acting as secretary *pro tem.*

### MISCELLANEOUS BUSINESS.

*Deterioration of Cast Iron in Cylinders.*—Mr. Babcock described a peculiar deterioration of cast iron he had observed about the cylinders of an engine in Mystic, Conn. The water used was pretty pure spring or well water; steam worked at 60 lbs; india-rubber packing used in the cylinders; various kinds of oil used, but lately the best sperm. The steam pipes leading to the cylinder were not affected, and the interior of the cylinder, on which the friction of the packing took effect, was clean and bright as usual. But the parts of the cylinder beyond the reach of the friction were strangely changed. The surface of the iron was softened so that it might be whittled with a knife; bolts or screws lost their hold in it. The change sometimes reached the depth of one-half an inch.

Mr. Dibben—The effect was evidently not due to acids or other impurities in the water. The change seems to have begun at the point at which oil was used. The oil must have been quite impure, and the iron wsa converted into a kind of plumbago, which is a carburet of iron.

A stranger said he had observed similar changes of iron where there was no doubt that oil was the occasion of them.

Mr. Howe—There is not carbon enough in cast iron to produce its volume of plumbago; but the oil, which contains carbon, might furnish it.

The Chairman—Oils are often purified by acids, and the acids are not completely removed; also, the rubber of the packing contains sulphur. Both acids and sulphur destroy the tenacity of iron. It is quite common for boys to find pieces of iron about machine shops or foundries, which they carve with their jack-knives into images.

Mr. Seely—The facts which we are trying to explain are not clearly presented; we need a sample of the deteriorated iron. An analysis of it would show precisely the nature of the change. Cast iron completely dissolves or disappears in nitric acid; the iron is dissolved and the carbon is burned up. In hydro-chloric acid, the iron dissolves, and the carbon does not, but settles as a powder. But if the cast iron be left in salt water a long time, the iron is dissolved out, and the carbon is left in the coherent form of plumbago. The carbon being the electro-negative, possibly accumulates other negative matter with it; but we have no facts to warrant us in concluding that carbon itself is ever deposited by any electrical action. I do not believe, in the case in question, that the iron absorbs any carbon from the oil.

Mr. Stetson exhibited a sample of iron from the boiler which lately burst at a hat factory in Brooklyn. The plate was of reasonable thickness, but was composed of irregular laminæ—thickest and toughest on the outside—which might easily be separated from each other.

Mr. Selleck—Boiler plate is rolled down from "billets" about one foot in thickness. The billets are partly composed of old scraps, which should always be mixed in the same proportion to secure a uniform plate. But manufacturers are not careful enough, and often get an excess of scrap. Sometimes too large "blooms" are attempted to be worked with a light hammer; the strength is then on the outside, while, in the interior, the iron is rotten. Bits of soapstone (which lines the furnaces) often get into the mass of iron, and make bubbles and weak places. Iron may be good and its manufacture bad. The sample shown is good iron, but very poor plate.

The hour for miscellaneous business having passed, the chairman called up the regular subject—"Superheated Steam."

### DISCUSSION.

Mr. Stetson—The trials of superheating have generally failed from overheating, and thus burning the superheating surface. The well-known trials on the *Arctic* and *John Furran* were unsuccessful from this cause and the complication of methods. At Mystic, Conn., they have had in operation, three years, a superheating system which realizes an economy of 25 per cent. It was the Wethered process of mixing superheated with normal steam, which failed on the *Arctic*. Mr. S. then illustrated, by an indicator card of the engine of the *Pacific*, made in 1853, the exact theoretical gain by superheating.

Mr. Babcock—The superheating contrivances at Mystic are automatic, and operate with great regularity; so that the temperature of steam does not vary 10° in 24 hours.

Mr. Dibben—Facts confirm the theory.

Mr. Goodwin—Was not a steam engineer, but saw many years ago an invention to remedy the difficulty from foaming in the boiler. The steam, before it issued away from the boiler, was made to pass through a considerable length of coiled pipe.

Mr. Fisher gave an account of several trials of superheating on steamers. There was as much failure as success; but we shall learn how to guard against the causes of failure. Superheating will some day be generally adopted.

Mr. Seely—Superheating steam, so-called, is much used in the chemical arts. Mechanics mean by "superheated" steam, "dry" steam; in addition to this, chemists sometimes mean only steam above 212°. Where steam is used for dessicating purposes, it must be dry; if hot-air has no injurious chemical effect, it is better and cheaper than steam. Steam is also used to effect decompositions by heat, as in charring wood, making stearine, &c.; and for this purpose it is not essential that it be dry. Superheated steam is also spoken of as a solvent, of quartz, for example. For this use, the steam must not be dry; and it is doubtful if water, at the same temperature, would not be more effective. I consider that a great deal of humbug is made about the use of steam for chemical arts.

Mr. Rowell—The subject of superheated steam for engines was first agitated here by Mr. Frost. He showed that steam at 212° was increased one volume by an addition of 4°; another by 12°; but that a third volume required about 500°. [This discrepancy, with the common notion of expansion by heat, is explainable by supposing that the steam at 212° maintains in suspension particles of water ready to burst into steam by a slight increase in heat.—REP.]

The subject for the next meeting—the "Adulteration of Food"—was then selected, after which the association adjourned.

## AMERICAN NAVAL ARCHITECTURE.

In fulfillment of an intention expressed in the first paragraph of an article bearing the above caption, and published on page 131 of the present volume of the SCIENTIFIC AMERICAN, we now give the following details (reported expressly for this journal) of some recently-built steamers, embodying most of the modern improvements.

### THE STEAMER "NEW LONDON."

This is a new vessel, built by the New London Propeller Company, and has recently taken her appropriate position on the route of her intended service, between New York and New London. Her dimensions, with minute particulars of engine and boiler, will be found annexed:—Length on deck (over all), 130 feet; breadth of beam (molded), 26 feet 8 inches; depth of hold, 8 feet; draft forward, 8 feet; draft aft, 10 feet; tunnage, 260 tuns. Her frame is of white oak and chestnut (molded), 12 by 8 inches and 9 inches, and is 24 inches apart at centers.

The *New London* is fitted with a vertical direct-action engine; diameter of cylinder, 34 inches; length of stroke of piston, 2 feet 6 inches; diameter of propeller, 9 feet; length of same, 1 foot 6 inches; pitch, 17 feet; and possesses 4 blades. She has one return tubular boiler; length, 18 feet; hight (exclusive of steam drum), 8 feet 8 inches. It contains two furnaces, the breadth of which is 3 feet 3 inches; length of grate bars, 7 feet 3 inches; number of flues, 26, internal diameter above, 16 of 8 inches: below, 8 of 3½ inches, and 2 of 16 inches; length of flues above, 16 feet 10 inches; below, 9 feet 8 inches; diameter of smoke pipe, 3 feet. The boiler is located on deck, and uses a blower to her furnaces.

She is fitted with one independent steam fire and bilge pump, and has, in addition to this, bottom valves or cocks to all openings in her bottom. She is schooner-rigged, has poop cabin and freight house forward to foremast.

Her hull was built by George Greeman & Co., of Mystic, Conn.; her engines, by C. H. Delamater of this city.

### THE STEAMER "ALABAMA."

This steamer is a fine specimen of modern naval architecture, and does honor to her builders, Samuel Sneden & Co. She has been plying between the ports of New Orleans and Mobile since December last, and has, upon all occasions, more than exceeded the sanguine expectations of those who were interested in her erection. Annexed will be found full particulars of her dimensions, with minute details of engine and boiler:—Length on deck (from fore part of stem to after part of stern post, above the spar deck), 235 feet; length between perpendiculars, 225 feet; breadth of beam (molded) at midship sections, above the main wales, 32 feet 3 inches; depth of hold to spar deck, 9 feet; draft of water at load line, fore and aft, 4 feet; tunnage, 656 tuns; area of immersed section at above draft, 115 square feet. Her frame is of wrought iron plates, 5-16ths to ½ inch in thickness, and fastened with rivets ⅝ of an inch in diameter; the frames are molded, 3½ inches, sided, 5-16th inch, and 17 inches apart at centers; shape of same, *7 Z*; width of flanches, 3½ inches. The cross floors are 15 inches high, and 5-16ths inch in thickness; shape, Z, and fastened with ⅝ inch rivets every 2¼ inches.

The *Alabama* is fitted with a vertical beam engine; diameter of cylinder, 50 inches; length of stroke of piston, 10 feet; maximum pressure of steam, 25 lbs.; cut off at one-half stroke.

She has one return flue boiler, the length of which is 30 feet 6 inches; breadth of same at furnace, 12 feet; diameter at shell, 10 feet 9 inches; hight (exclusive of steam drum), 10 feet 9 inches. The boiler has 3 furnaces; breadth, 3 feet 7 inches; length of grate bars, 7 feet 2 inches. Number of flues above, 6 of 18 inches, and 6 of 9 inches; number below, 2 of 10 inches, and 8 of 15 inches; length of same, above, 26 feet 2 inches; length below, 17 feet 5 inches; diameter of smoke pipe, 4 feet 2 inches; hight above grates, 30 feet.

The diameter of her paddle wheels (over boards) is 29 feet 8 inches; length of blades of same, 8 feet; depth, 24 inches, and 26 in number. The boiler is located in the hold, and does not use blowers.

She has one independent (extra size) steam fire and bilge pump, one bilge injection, and bottom valves or cocks to all openings in her bottom; also, water wheel guards fore and aft, bunkers of wood, and four watertight bulkheads. There is a commodious saloon on the main deck, and a saloon cabin above.

The machinery was built by the Morgan Iron-works, this city; the owners are J. L. Day and others.

### THE STEAM TUG "YANKEE."

This tug is a very powerful one for her size, and a short time since began her duties as a tow-boat in the harbor of New York. She was built in this city by Thomas Collyer, and is owned by Russel Sturgis. Her frame is of white oak and chestnut, and very securely square fastened with copper and treenails. The dimensions of her hull are as follows:—Length on deck, 146 feet; breadth of beam (molded), 25 feet 6 inches; depth of hold, 10 feet; area of immersed section at load draft of 5 feet, 170 square feet.

The *Yankee* is fitted with a cross-head engine; diameter of cylinder, 38 inches; length of stroke of piston, 8 feet 8 inches.

The diameter of her water wheels (over boards) is 21 feet 6 inches; length of boards, 9 feet; depth, 3 feet; number of same, 20.

She has one return flue boiler, built in this city in 1858; length, 20 feet 3 inches. It is located in the hold, and uses a blower. Her bunkers are made of wood. She is not rigged, and not coppered; possesses one smoke pipe; has no independent steam fire and bilge pump, and no opening in her bottom, has, however, one bilge injection; is not supplied with water wheel guards; tunnage, 376 tuns.

The builder of the engines of the above vessel is J. P. Allaire, of this city.

## SAVING LIFE IN SHIPWRECK.

MESSRS. EDITORS:—The recent marine disasters (stranding of ocean steamers, and loss of life) has prompted me to make, through the columns of your much valued paper, the following suggestion to the minds of those interested. When a ship is stranded with a strong wind on shore, why would not a common kite,

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built of strong and light materials and of a proper size, be an excellent thing to open up a communication with the shore, when no other or more preferable means were available? I am a seafaring man myself, and really believe that such a mode, had it been thought of, would have been found practicable in saving lives in many cases of shipwreck. It would be but a trifling expense for a passenger vessel to add to their stock of life-saving apparatus a silk kite, so constructed as to fold up snug when not in use, with a liberal supply of light, strong line. The chances are that in such cases as those of the *Indian*, *Northerner* and *Hungarian*, it might become of vital importance. Let some enterprising Yankee get up a folding kite, so as to be snugly stowed in a tin case.

Albany, N. Y., March 5, 1860. F. A. M.

## DEFECTS OF CALF-SKIN LEATHER.

MESSRS. EDITORS:—On page 67 of the present volume of the SCIENTIFIC AMERICAN, I noticed an article on the "Defects of Calf-skin Leather," giving some account of what was termed "dry rot," which article greatly impressed me at the time; yet it did not fully meet the case. On page 137, the same subject is again referred to, with some comments, by two correspondents. One (C. L. Robinson) has some good ideas, yet does not give a full solution. I have had some 30 years' experience in the manufacture of boots and shoes; during that time, I have particularly endeavored to ascertain the cause of defects in calf-skins, those being more sensitive to any chemical action than perhaps any other kind of leather, for want of maturity in the texture of the skin. I am led to conclude that the principal difficulty is in the process of tanning, in the use of lime, and especially in what is called *baiting;* the tissues of the skin being so very delicate that any carelessness or ignorance in these processes proves injurious. This is an old complaint, and one that has been prolific of thought and experiments for several hundred years, with but very little practical benefit. The field is still open for research, and would yield a fortune for any one who solved this great chemical problem. The wax-like substance which exudes near the seams and soles of boots and shoes is not what has been called "dry rot," or any particular kind of decay in the skin, but is produced by the oxyd of iron in the blacking used for coloring the edges of the soles and seams, which blacking has a strong affinity for the oil in the leather, especially for resinous oils, which in its amalgamation decomposes the fibers of the skin; this, even where this substance does not appear, is the more immediate cause of the cracking of the upper-leather near the soles. I am satisfied that the more active agents are the oxyds and oil, as this peculiar effect is confined exclusively to that finished with oil, such as harness, "top," and other kinds of *grain* leather, when this kind of coloring is used, except (as before stated) when the oxyd in the blacking is brought into contact with the oil in the leather. The better the quality of the oil, the less its injurious effects. Pure, sweet neats-foot oil is probably the best. For several years I never allowed the blacking used for coloring edges to touch the upper-leather; and this carefulness, in a great measure, prevented the cracking from the soles. I have known a calf-skin to be kept for more than *twenty years*, and to be then made into boots which did excellent service; still, I do not think they improve by keeping. A pair of calf-skin boots which I had made for me in 1835, have been worn frequently ever since, and are now in a very good state of preservation. One defect in the manner of dressing calf-skins is the too free use of the *curry knife*. Skins wear much longer when finished as near their natural thickness as can be, and yet obtain a smooth surface; the fibers near the flesh being very much stronger than those near the grain. A too free use of oil, even the best, tends to injure rather than improve calf-skins; when oil is used the leather should be clean, and moistened with water before applying the oil. M.

Wakefield, R. I., March 6, 1860.

## GREENWOOD CEMETERY IN WINTER.

[Communicated.]

The majority of people ignore Greenwood in this dreary season. One knows during the summer the pleasant avenues are thronged with strangers of all climes, curious to see a novelty; well-known citizens, anxious to breathe the rose-scented air and watch the gorgeous flowers that bloom silently above so much hallowed dust; and tearful mourners, wending their steps towards the tombs of beloved lost ones. Thus, as the south wind plays merrily over it, it seems a city of the living; but all now wears a deserted appearance. We could fancy ourselves in some forsaken city of the past ages. We have recently been through the grounds, and found them sublimely beautiful in their winter covering. The few leaves that are left flutter solemnly in the cold blasts from the north. The tufts and tops of snow-flowers were in close embrace here and there to the dull earth, peeping modestly from their fair dress and nestling lovingly in strange communion with the dark evergreens. The gigantic trees rear their lofty heads, standing out in strong contrast from the backgrounds of gray, murky sky—staunch emblems of a Creator—fit monuments of the fitful sleep of nature.

If it were our mind to seriously ponder this subject, we could add, as we now stand in this place, amid its majestic silence and the pungent realities of this season, we are taught some of our noblest lessons in life. It is at such times those sweet and hallowed memories often visit men, as they struggle through rugged scenes, giving them heroic souls, filling them with encouragement and making them better by their ministrations. Happy thoughts, of days long since gone, mingle with grief, as we cast still another glance at the graves of departed worth; but enough of this.

Freeborn's monument rises proudly on Battle-hill, towering far above the minor incidents of leaves and flowers, beautifully harmonizing with the majestic grandeur of the surrounding landscape.

The delicate framework of Charlotte Canda's tomb appeared to miss its covering of roses and foliage, and looked cold and lonely. We never see this monumental pile without having a sad thought; we see a beautiful girl—reveling in the pleasantest realities of life, and living, as it were, in the illuminated land of hope, whose whole life was a river of pure water—cut down in a second of time by "the fell destroyer" (who is no respecter of persons) and consigned to the earth.

Capt. F. Cobraja's striking monument deserves attention. It was erected by himself after his own design, and represents a statue of life size, in sailor costume, standing on a capstan, with a sextant to his eye, taking an observation by the sun. The aged seaman, we believe, is still living, taking great pride in his tomb; and although he is eighty odd years of age, he has, until recently, taken the sole charge of it himself. He, too, must soon be launched on a sea that he has never yet explored, speeding his way to that "bourne from which no traveler returns."

In this place there are many beautiful specimens of American marble; and it is really gratifying to see that the unjust prejudice long existing against the marble of this country is dying out, and that, in this respect, a new era has commenced. Certainly our country is rich in marble quarries, and it is a matter of much surprise and great regret that they have so long lain dormant, and that their abundant resources have not been far more fully developed; much of it will compare very favorably with some of the Italian.

Our *cicerone* on this occasion (a man apparently 40 years of age) was shy and modest—a rare virtue in a hack-driver; but a few questions awakened his recollection, and he detailed to us many pleasing reminiscences of his boyhood life. He had lived there all his days; childhood had been spent in climbing "Battle-hill," and roaming amongst the unshorn grass of the "Tour" and the other avenues, whilst they were the home of the living instead of the dead. "Sylvan Lake" had been a swimming pond to him when country farm-houses surrounded the place. The whole grave-yard was silent and all seemed inanimate; yet as we were departing, a snow-bird flew over our heads, making a doleful noise that might have easily been construed into a question, asking by what right or authority we had presumed to breathe in the "City of the Dead." It was the only thing of life on the premises.

An immense outlay is yearly required in grading and keeping the cemetery in repair, and this has been of late a heavy drain on the treasury; yet the company seem not to care for this, but to be determined to continue ornamenting until it shall surpass in beauty and design anything of its kind in the world. B.

THE tunnage dues annually paid in Liverpool amounts to $1,750,000. It is the largest seaport in the world.

## A COLUMN OF VARIETIES.

The equinoxes, by the movement which is called precession, have slid thirty degrees to the westward of the constellations with which they were originally associated. This fact, combined with the known rate of precession, shows that the constellations were named about 307 years before the Christian era, that is to say, soon after the establishment of the Alexandrian school of astronomy.....It is stated that when the twelve hundred clerks employed in the Bank of England leave the building in the evening, a detachment of troops marches in to guard it in the night, although burglars could not penetrate the solid vaults in six weeks..... Sir Isaac Newton never believed in the wave theory of light, and recent discoveries have strengthened very much the doubts of its truth which have always been manifested by some of the greatest writers on the subject.....The calcium or lime light was discovered by Dr. Hare, of Philadelphia, soon after his great discovery of the compound blow-pipe.....The yellow ray of light is not merely inoperative when falling upon photographic paper, but it actually protects the paper from the influence of the actinic rays .....A sheet of black mica, which cannot be seen through at all, transmits those rays of heat which come from a stove not red-hot, more readily than they are transmitted by a plate of the most transparent glass.....The light of the tropics is not so powerful for photographic purposes as that of the temperate zones; a longer time being required to take a picture.....Photographs are more readily obtained in April and March than in June or July.....One of the large anacondas in Barnum's American Museum has recently been delivered of a litter of young. Snakes are ova-viviperous, that is to say, eggs are formed and hatched within the body of the animal. This, probably, has given rise to the popular notion that these reptiles swallow their offspring.....The *Nondescript* in Barnum's Museum is certainly a curiosity —though a disagreeable one. It looks like a deformed idiotic little negro.....Steam shipping has increased to such an extent that a large weekly newspaper is published in London, devoted exclusively to the subject. It is called *Mitchell's Steam Shipping Journal*.....The great eclipse of the sun which takes place on the 18th of next July, will be total in Spain, and it is said that at least forty astronomers, from various parts of Europe, intend visiting that country on the occasion, in order to observe the phenomenon.....The forenoon is the best time to have a photograph taken, as the morning sun produces better effects than can be obtained after 12 o'clock..... Sulphuric acid combined with iron forms sulphate of iron, but simple sulphur and iron, in combination, receive the name of sulphuret of iron. The same rule is applied to other substances—thus, carbonic acid and soda form the carbonate of soda, while a combination of carbon and hydrogen is called carbureted hydrogen.....Land has been sold in Fleet-street, London, at the rate of £900,000 equal to about $4,500,000 per acre; this is at the rate of $100 to the square foot, and would amount to about $200,000 for one of one of our up-town lots of 20 feet front.....The Maryland code has been so revised as to put an end to lotteries. The penalty is a fine of $1,000 or imprisonment.....When Elias Howe, Jr., the inventor of the first practical sewing machine, returned from England, his funds were so exhausted that he worked his passage as cook.....As Spain has a dry season in the summer, similar to that of California, there is no doubt that there will be a fine opportunity for viewing the great eclipse from that country, next July.....Although steel is believed to be harder and stronger in some proportion to the amount of contained carbon, cast iron, when it is very rich in carbon, is soft like plumbago, will break by its own weight, and may be cut with a knife.....A correspondent of the *Times* (London) states that in the Commune d'Ecully, in France, two men were buried alive in a well by a fall of loose earth, and that after twenty days one of them was taken out still alive; having survived the want of air, light and food, throughout that long period, in addition to the impossibility of moving and the presence by his side of the dead body of his unfortunate companion, for a considerble portion of the time.....In the comprehensive experiments made by Robert Stephenson upon different varieties of cast iron proposed to be employed in the High Level Bridge. Hot-blast iron was found to have nearly the same strength as cold-blast.

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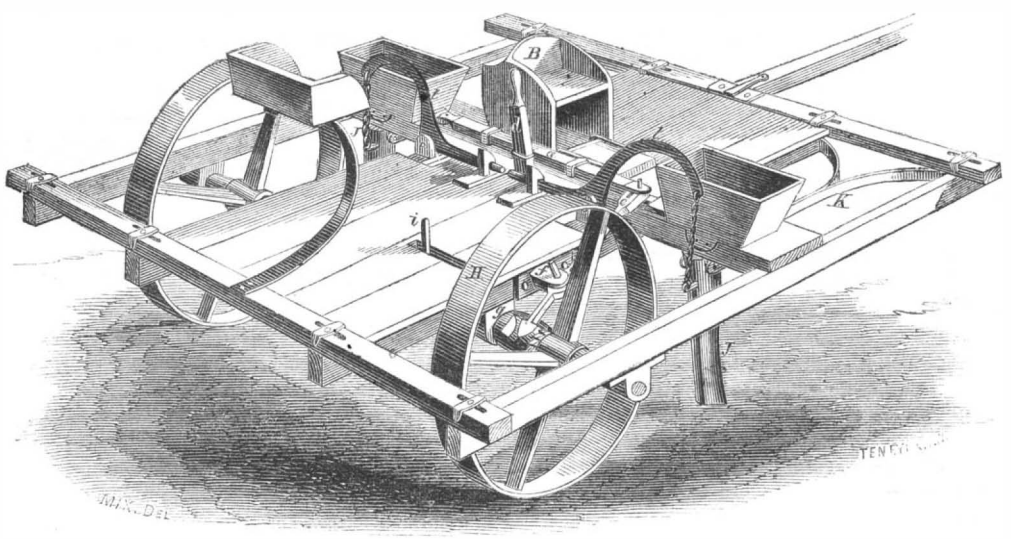
## IMPROVED SEEDING MACHINE.

We recently described a corn planter which accomplished the long-sought and valuable *desideratum* of planting the corn in rows both ways; and we now present one which will either do this by the aid of a boy (as in the machine previously described), or it will plant in rows one way by an automatic arrangement without the assistance of a boy, as may be desired.

The body of the machine consists essentially of a cart or flat platform, supported on two wheels (as represented in the engraving), each wheel having its independent axle running between its own pair of longitudinal bars, which pairs of bars may be adjusted to a greater or less distance from each other, according to the width at which it is desired to have the rows of grain apart. To plant the corn in rows both ways, the planting is to be done across furrows previously drawn at right angles; and, in this case, the slide, *a*, for dropping the corn, which passes into both hoppers, is worked by means of the lever, *d*, by a boy sitting in the seat, B.



MARKHAM'S IMPROVED SEEDING MACHINE.

But if it is desired to plant the grain in rows only one way, then there is no occasion for previously furrowing the ground, and the slide, *a*, is worked by a self-operating device. The lever, *e*, which has its fulcrum at *f*, is provided with a head at its lower end which is operated by cams on the sleeve, *q*, which fits loosely upon the axle of the wheel, H. A ratchet upon the sleeve, *q*, is operated by a pawl attached to the wheel, H, so that when the wheel, H, rolls forward, the sleeve, *q*, is turned, operating the lever, *e*, and the slide, *a*, but the pawl slides over the rachet when the wheel is turned in the opposite direction, thus relieving the planting machinery from action in backing the machine. When the slide is operated by an assistant for planting in rows in both directions, the pawl is lifted from the ratchet by moving the lever, *i*, which is placed in convenient reach of the driver's foot for this purpose; thus relieving the dropping machinery from being operated by the turning of the wheel.

The seat, B, is made double, so that by turning it down, the boy can face in the opposite direction, and can thus always see the uncovered furrows, in whichever direction the machine may be going The seat, B, also slides a moderate distance towards either side of the frame, in order to bring the boy in a position convenient to the lever, *d*.

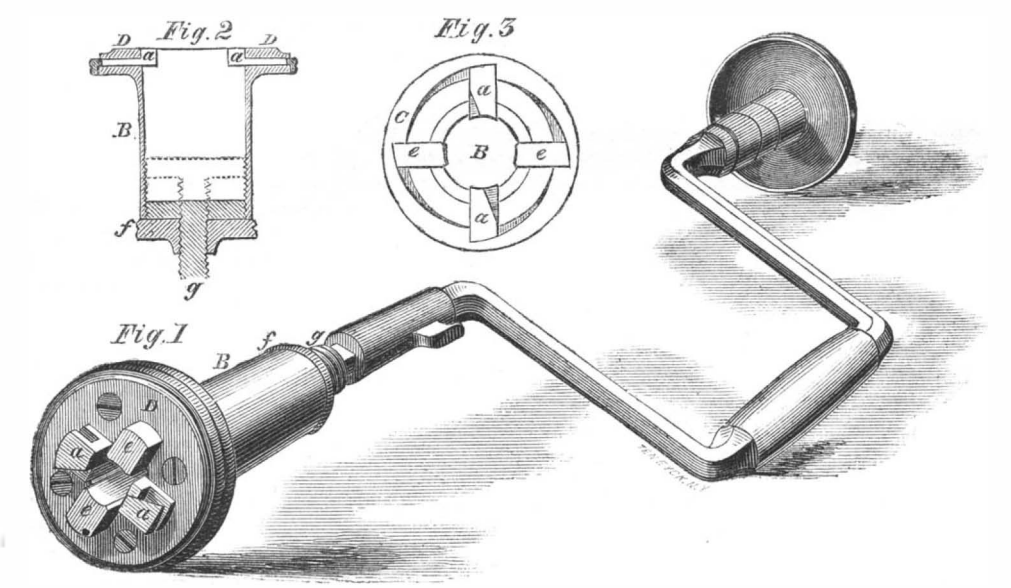
The hollow tubes, J J, through which the seed is dropped, are fashioned at their lower ends in proper shape to open the furrows, and are suspended at the ends of forked bars, K, so that they may be drawn up clear of the ground by means of the chains and levers, *l l*, when the machine is being transported to or from the field; or, if desired, vertical posts with holes may be provided for adjusting the depth of the hollow tubes in the ground.

The patent for this invention was obtained through the Scientific American Patent Agency, January 3, 1860; and persons desiring further information in relation to it will please address the inventor, Geo. B. Markham, at Mead's Mills, Mich.

## IMPROVED TOOL FOR CUTTING ROUND TENONS.

The annexed engraving represents an improved tool for cutting round tenons (invented by L. A. Dole) which may be either used on a bit stock, as shown, or placed on a spindle and driven by machinery. The improvement consists in devices for adjusting the implement to both the size and the length of the tenons desired.

The cutters, *a a*, are formed with shanks, as represented in Fig. 2, which slide inward and outward in grooves formed in the head of the hollow iron cylinder, B. For cutting the largest size tenon, the cutters are placed outward to the extreme end of the groove, and are drawn inward for smaller tenons. This adjustment is effected by means of the ring, C (Fig. 3), which is made with curved depressions fitting against the outer ends of the shanks of the cutters, so that, by turning the ring, these are forced inward, the ring operating as a wedge or series of wedges. After the adjustment is made, the cutters are held in placed by having the plate, D (Figs. 1 and 2), screwed firmly down upon their shanks; the screws being loosened to effect the adjustment. Two blanks, *c e*, are placed at right angles with the cutters to hold the cylinder, B, in its position concentric with the tenon.




DOLE'S IMPROVED TENONING MACHINE.

For regulating the length of the tenon, the depth of the hollow in the cylinder, B, is varied by screwing the shank, *g*, a greater or less distance into it. When this adjustment is effected, the nut, *f*, which has a left hand screw, is turned against the end of the cylinder, holding the parts in place; the left hand screw causing the nut to bind more firmly when the tool is turned in its cutting operation.

The patent for this invention was issued Jan. 10, 1860, and persons desiring further information in relation to it will please address Dole & Silver, Salem, Ohio.

PETROLEUM OR COAL OIL.—At our request, Colonel Whittlesey, who has recently visited the excited districts in Pennsylvania, has given us some items in regard to the petroleum or coal oil which is now being procured there. Oil springs, as they are called, have long been known and laid down upon the maps of Venango and Warren counties, and of other localities in Pennsylvania, and of Ohio and Virginia. The material is naphtha, which exudes from the earth in various parts of the world, and, becoming by exposure more dark colored and less fluid, takes various names, such as petroleum, mineral tar, asphaltum, &c. In Pennsylvania it has been frequently found in wells bored for salt water on the Alleghany river, where it was considered as a nuisance, on account of its villainous odor and the tenacity with which it adheres to clothing, wood and leather. He thinks it would not be too high an estimate to place the number of wells now being bored on the waters of Oil creek and the Alleghany, within a distance of forty miles, at one hundred. Many of them as yet have no oil. This mineral, too, is represented by him as being found in a formation known to geologists as the "Chemung Group," which extends from Pennsylvania into and through Ohio. The oil is most abundant in a stratum of one hundred to one hundred and fifty feet in thickness, composed of laminæ of soft blueish shale or slate. Inflammable gases flow out with it in bubbles, or in powerful discharges, producing a rumbling sound that ends frequently in an explosion, greatly to the terror of the workmen. In some of the wells on Oil creek the liquid bitumen was struck at 70 to 90 feet. It is tranported in barrels to New York, to be distilled and purified for coal oil. Its value depends upon the per-centage of refined oil it will yield.—*Cleveland (Ohio) Herald.*

TERRIBLE STEAMBOAT EXPLOSION.—On the 6th inst., the *Alfred Thomas*, a neat little steamer, just built at Easton, Pa., to run on the Delaware river, exploded its boiler with terrific violence, just after starting. It had been standing with the steam up for some time prior to starting, and had the engineer kept the feed pump going then, and permitted a slight escape of steam, the accident would not have happened. Ten persons were killed, and fourteen severely wounded. The boiler is stated to have been too small, and that a sufficient quantity of steam could not be generated, to work upwards against the current of the river; therefore, the boat stopped to raise steam to the pressure of 125 lbs. to the inch, and in doing this, the flues became red-hot as the pressure increased. When the signal was given to start, the engineer commenced pumping in cold water, and the explosion instantly followed. Mr. Schaeff, the builder of the boat, was also its engineer, and was killed. Previous to the explosion, the gage indicated a pressure of 125 lbs. There is no mystery as to the cause of this explosion; the boiler was managed as with an intent to commit suicide.

THOSE interested in hydraulic engineering should read the article, on page 178, by Jos. W. Sprague, Esq.

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NEW YORK, SATURDAY, MARCH 17, 1860.


## AGRICULTURAL SCIENCE AND MACHINES.

UR people seem to be devoting attention to agricultural science with a fervor which augurs well for its future growth and progress. Every State, we believe, has now its agricultural society; and there are county and town farmers' clubs almost innumerable. In addition to these, there is a United States Central Association, numerous agricultural periodicals and farm schools; and perhaps a higher influence, in some respects, than all of these, are the chairs of agricultural chemistry which have lately been established in some of the old colleges. These great and manifold agencies for increasing and spreading information on agricultural subjects ought to yield good fruits and bring forth abundant harvests. One of the best evidences of the desire now felt for the acquisition of agricultural science is the series of popular lectures which were recently given at Yale College by eminent practical and scientific agriculturists and horticulturists, who had been invited for the purpose from every section of the country. These lecturers detailed the results of their experience, and the methods which they practiced; and they expressed their opinions as to the best modes of cultivation and the most suitable fruits and grains for different soils and climates. This was teaching science in the very highest sense.

The questions naturally arise: why is there such an ado made about improved agriculture now-a-days? Do we not feed ourselves, and also supply other countries with large quantities of provisions, and are these not evidences of the prosperous condition of agriculture among us, and the high state to which the science and art have been carried by our farmers? To these, we answer: this subject is of vast importance to our people, because two-thirds of our population are engaged in, or connected in some manner with, agriculture; it is the greatest interest of our country, and ought always to engage the most attention. Another reason why this should excite them in more than an ordinary manner at present, is the fact that in most of the older cultivated districts the crops have decreased, both in quality and quantity. This has caused alarm, and it accounts for the activity among our people to retrieve evils which had been inflicted upon the soil by former unwise and unscientific farming. There are many extensive tracts of country, where wheat was once cultivated with great success and profit, where not an acre of it is now grown; and this is the case with some fruits, also, such as the peach and plum, which are now aliens to the same lands on which they once flourished. It has been proved that, in proportion to the extent of soil cultivated, there has been a decadence of the agricultural products of our country, and this has been caused by improper cultivation and exhaustion of the soil. The fact was formerly not duly appreciated, that the grain, fruits, hay, butter, beef and pork raised on farms, and sold to consumers, represented so much of the fertile soil itself, and that every bushel of wheat or other crop taken from it required to be returned again in some form as constituents, under the penalty of future barrenness. This fact is now universally recognized, and it forms the very foundation stone of agricultural science. Old farms, under proper cultivation, can be made to yield larger crops than new farms; but the best methods of enabling them to do so can only be acquired by experience. The whole science and art of agriculture may be summed up in a few words; it consists in the practice of the most successful farmers; this is the only sure guide for others to follow. Many persons seem to consider "agricultural science" in the light of an abstraction; something exceedingly subtile and vague, which can only be learned in colleges. But we assure them it is something exceedingly practical; it means nothing more than farming conducted in the best and most systematic manner.

At this season of the year, we call the attention of our farmers to these, the leading ideas which should govern in agriculture. In the mechanical department of farming, it is a gratifying fact that our country is unrivaled; thanks to our inventors, and the encouragement given to them by the protection of patents. No farmer can really be successful unless he employs the most improved labor-saving implements and machines; and to us it is a most certain sign of success and progress to witness the alacrity of our farmers in adopting the most recently patented and improved machinery. Among the most valuable patents issued are those for agricultural implements; they meet with ready sales, and are justly remunerative. Every farmer should commence the season's operations with the best implements he can obtain; they will yield profitable returns for their cost before the year is closed.

## TRADE STRIKES.

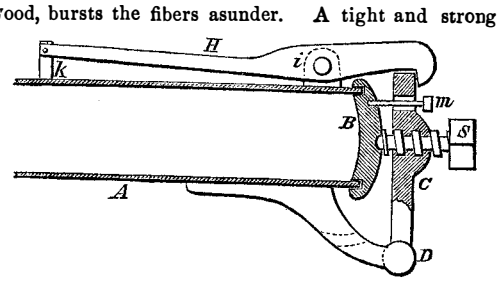
It is a blot upon modern civilization that the war of trades and classes is still waged as fiercely as of yore. Mutual good will should exist, and a fair understanding should always reign among employers and their workmen. The question of industry should be viewed in a broad light, unbroken by selfish individual interests; because, in reality, the interests of employers and employed are one. How very seldom—almost never—do we find these parties feeling and acting right towards one another. They seem to act as if their welfare and prosperity consisted in looking out for their individual interests, even to the injury of one another. They act upon purely selfish motives; and this being the case, frequent outbursts like that which took place in London among the builders, last year, and the strike now going on among the shoemakers of Marblehead and Lynn, Mass., may be expected—it cannot be otherwise. The last-mentioned strike is for a rise of wages among the shoe operatives of all classes—male and female. From published statements, it is evident that their wages have been very low, and we would be glad to see them greatly elevated. If it is possible to do this, it would be better for both operatives and manufacturers; but here comes the practical question upon which it is very difficult to pass judgment. It is said that the wages of the shoemakers have been reduced by manufacturers endeavoring to undersell one another, and that they have gradually reduced the prices of labor in order to sell low in the market. If this is so, we must say that the manufacturers did wrong, both for their own interests and those of their workmen. On the other hand, if, as some others have stated, the manufacturers have large stocks of goods on hand and cannot get paying prices for them, they cannot give prices that will cause loss on stock and capital. The question of "labor and demand" is one which operates by natural laws, and cannot be over-ruled by manufacturers or their workmen.

Trade strikes are usually impolitic, and end in the defeat of the operatives. They depend for their daily bread upon their wages, and when they cease laboring penury follows. But no matter which party is successful, the dregs of a strike are sour and bitter to both; because a spirit of mutual ill-will is usually engendered, and this is seldom, if ever, entirely removed. This being the case we deprecate all trade strikes, and would rejoice to see "courts of conciliation" established in the manufacturing districts to settle all "industrial disputes."

## A SINGULAR ACCIDENT.

On Saturday, March 3d, a most singular casuality occurred at Elizabethport, N. J., which resulted in the very wonderful escape of Mr. George Gee, and in the death of Mr. Wm. Allen, brother of Mr. Horatio Allen, of the Novelty Works. It was the premature discharge of an apparatus for separating the fiber of wood for making paper and other fabrics, which was patented by A. S. Lyman, of this city, Aug. 3, 1858, and which is now attracting a great deal of attention.

It is well known that wood is composed of an immense number of minute tubes, arranged in a position parallel with the grain. Mr. Lyman's plan consists in filling in these tubes with steam or water under a high pressure a close vessel, and then suddenly ejecting the wood into the open air, when the pressure of the steam, being no longer counterbalanced by the pressure external to the wood, bursts the fibers asunder. A tight and strong



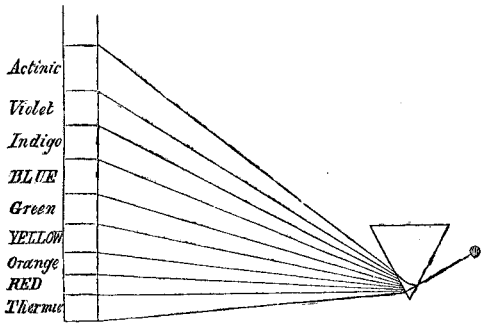

iron cylinder, A, in the annexed cut, 7 inches in diameter and 20 to 25 feet long, is prepared with one end permanently closed and the other covered with a movable valve, B, held in place by a latch, H. The wood is placed in this cylinder (or gun) and subjected to a pressure of steam of 180 lbs. to the inch for a sufficient length of time to heat the wood through to a temperature corresponding with this pressure, when the valve, being released from the hold of the latch, is blown off, and the wood is shot out into the open air. The steam in the tubes, being no longer confined by external pressure, expands and tears the fibers asunder. The lever, C, is provided with the screw, S, for adjusting the pressure of the valve to the end of the cylinder.

On the day mentioned, Mr. Gee had loaded the gun, and on shutting down the cap, perceived that the steam escaped. As he was endeavoring to ascertain where the breakage was, Mr. Allen came up behind him and wished him good morning. Mr. Gee turned around, and just as Mr. Allen stepped in front of the gun, it exploded prematurely, the steam and fibrous wood striking him with such violence that his body was thrown several yards. He was, of course, instantly killed. Mr. Gee escaped without the least wound or injury. The body of Mr. Allen was brought to this city by a steam-tug on Sunday morning, and was landed at the Novelty Works, whence it was conveyed to the late residence of the deceased.

## THE PHILOSOPHY OF THE PHOTOGRAPH.

We have made a practice of mentioning the great discoveries which have, from time to time, been made in the art of sun painting; and finding so many photographers among our subscribers, as well as such wide spread interest in the subject, we design to hereafter make a fuller record of the numerous small improvements which are constantly being made in this most delicate and beautiful art. In order to render this department of our paper interesting to as large a portion as possible of our readers, we wish to make the accounts of these improvements intelligible to *all*; we therefore introduce them with a brief explanation of the principles of photography, which, it will be understood, is not intended for those who have thoroughly investigated the subject, but for those who have not.

The lights and shades in daguerreotype and photographic pictures are the result of chemical changes wrought in various substances by the action, not strickly speaking of *light*, but of an element in the sun's rays which is not perceptible by the eye, and which is therefore an element distinct from that light. When a pencil of the sun's




rays is admitted through a small hole in the shutter of a darkened room and allowed to pass through a triangular prism of glass, the ray is bent from its straight path and produces an image upon the wall, of varied and most exquisitely delicate colors. Sir Isaac Newton, who first made this experiment, pronounced these colors to be seven in number, the ray which is the least bent being

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the red, and the others in order the orange, yellow, green, blue, indigo, and violet. But later observers have studied the spectrum with far more care and minuteness than Newton, in the midst of his multifarious labors, was able to bestow upon; it and their researches have been rewarded by some remarkable discoveries. The most noteworthy of these is the discovery that the sun's ray is not simple, being composed of at least three distinct elements, light, heat, and the actinic rays, as those are called which produce most of the chemical changes. In one experiment by Sir William Herschell, he found that a thermometer suspended in the blue ray rose in three minutes 1°, in the green ray 4°, in the yellow ray 6°, in the red ray 16°, and below the red ray, where there was no visible light, 18°. Other observers have confirmed these results, and it is now fully established that the maximum heat is below the visible spectrum, where there is no light.

Again, if we place a sensitive plate or paper in the spectrum, where the yellow ray falls upon it, it will not be changed in the least, any more than it will in absolute darkness, the green affects it very slightly, the blue more, and the violet most; while the greatest effect is produced beyond the violet, where no light can be seen. By other experiments the elements of light and actinism in the sunbeam are completely separated, and there is no doubt of their being separate and distinct principles or forces.

How the actinic ray effects chemical changes we do not know; that is one of the mysteries which surrounds us in every department of knowledge. But that it does produce them we have abundant evidence. The changes operated by actinism are of three kinds: 1, chemical decompositions, 2, chemical combinations, and 3, alterations of color, in which we have no evidence of any modification in chemical composition. From the long list of these changes we select a few as samples of the three kinds.

The oxyd of silver will remain in combination for an indefinite period in the dark, but exposed to blue light, or to the dark actinic ray beyond the violet, it is decomposed into its elements, silver and oxygen. The same is true of the oxyd of gold, and of the oxyd of mercury.

Nitric acid is soon decomposed, if exposed to the light, into nitrous acid and oxygen. It is ascertained that this change is not produced by yellow light but by blue and the rays beyond the blue in the spectrum.

Among the *combinations* produced by light are the following:—

1. If chlorine and hydrogen gases are mixed together they may be kept in the dark for any length of time, but on exposure to the light they immediately unite in chemical combination, forming hydrochloric acid.

2. Carbonic oxyd gas and chlorine gas may also be mixed and kept in the dark, but when blue light, or the full sunbeam which contains it penetrates the mixture, the two substances enter into chemical combination.

3. Mere change of color is effected by light in several substances, among which is chloride of silver, which is changed from snowy whiteness to perfect black.

Now, the whole art of sun painting—including the daguerreotype, ambrotype, &c., as well as all the various processes of photography—consists in combinations of the several substances which are acted upon chemically by the actinic rays of the sunbeam, in their proper exposure to the action of the light, and proper treatment after receiving the picture to prevent it from fading away. Some of the processes are exceedingly simple, especially that of the daguerreotype, but we shall postpone a description of it till our next issue.

In accounts of new discoveries in photography, and in all discussions of the subject, such constant reference is made to the *spectrum*, that we present an illustration of it, to enable those of our readers who have forgotten the order in which the colors are refracted, to refresh their recollections without the trouble of consulting a book. Close observation has detected two additional colors not noticed by Newton—a faint but deep crimson below the red, and a pale lavender beyond the violet. As these are not generally mentioned we omit them in our cut. It has also been found that the seven (or nine) colors are all produced by three primitive rays—red, yellow, and blue; the orange resulting from a lappiug over each other of the red and yellow, the green from a mingling of the yellow and blue, and the indigo and violet being a mixture of the red and blue.

## THE PEMBERTON MILL TO BE RE-BUILT.

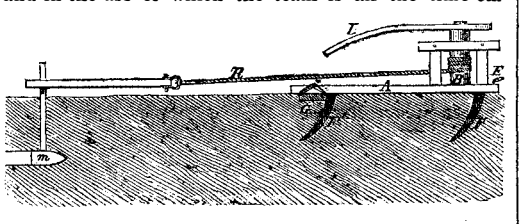
One of the owners of the Pemberton Mill has purchased the interest of his partner, and has announced that the mill will be re-built without delay. It is said to be his intention to put up a more substantial building than was ever yet erected for manufacturing purposes anywhere in the world.

There is now no doubt that the fall of the building was owing to the most gross negligence and want of fidelity in casting the columns. The cores were so negligently set, and so insecurely fastened, that they were floated by the melted metal to the upper part of the mold, making the upper side much thinner than the under side. In a great number of cases, the thickness of metal does not exceed 3-16ths of an inch, and is often less than $\frac{1}{8}$ of an inch, on one side.

A column so extremely eccentric, left to cool naturally, would, of necessity, be so crooked by reason of unequal shrinkage as to be rejected, of course, as a dangerous casting. But they could be, and, of necessity, must have been, straightened by weighting them while yet very hot. This process would at once weaken them, and lull to false security by giving them a deceptive appearance of uniform thickness. One overseer testifies that he was looking directly at a spinning frame, and saw it go down through the floor; while a man who was in the room below says he saw the shafting coming down in this same place. This was the commencement of this awful disaster. In confirmation of this direct testimony, the pillars among the ruins are found to be exceedingly thin; many of them on one side. It is even said that they may be broken with a stamp from the heel of a boot. In the architect's order, allowance was made for strength to support tenfold the weight that was placed upon the pillars; but they were not cast in accordance with the order.

## MOLE PLOWS.

MESSRS. EDITORS:—Your correspondent, F. A. W., on page 101 of the present volume of the SCIENTIFIC AMERICAN, writes that he labors under some disadvantages in taking up and putting in the stakes of his mole-ditcher; that he needs an extra team to move the capstan over the ground, and wishes to know if any machine has been got up that will save some of the labor he alludes to. I do not know what kind of a machine he has got; but annexed hereto I have tried to give him an idea of a mole-ditcher that I have seen in use in Morgan county, Ill., which did very good work, which requires no staking and in the use of which the team is all the time em-




ployed. A represents a plank lying upon the ground upon which plank is erected the capstan, B, in a strong wooden frame, said capstan being turned by the lever, L, to which are attached three to four yoke of oxen, according to the depth of the mole, M, say from three to four feet in the ground. F F are curved iron feet or stakes, curved backward or in an opposite direction to that in which the mole moves. G is a strong plank, say three by six inches thick and about eight feet long, which is tied upon the under side of A, and behind the iron foot, F, to prevent the rear of the machine sinking into the earth. All that is necessary is to put the mole in proper position in the earth, and the frame, A, with capstan, upon the top of the ground. Upon drawing the mole, the feet, F, enter the earth until the machine is firm. After the mole has been drawn up to the machine or capstan, all that is required to move it is to make the team fast to a stout chain or ring, E, and draw the capstan along in the direction of the work, to the extent of rope, replace the oxen to the lever, and go-ahead again. If the above is of any use to F. A. W., he is welcome to it. J. G. H.

Philadelphia, Pa., March 1, 1860.

## INDUSTRY—MANUFACTURES—COMMERCE.

*Boston Shoe Trade.*—The Boston *Traveler* says that there is no place in the world where so many boots and shoes are sold, in an equal area, as in Pearl-street, in that city. The shoe trade has become gigantic in its proportions, and Boston is the center of it. Thirty years ago the total value of the shoe trade in that city amounted to about $1,500,000 annually; now it amounts to $20,000,000, and the prospect is that it will reach $100,000,000 during the present century. The number of pairs sold in 1859 was 37,500,000. Most of these were for the southern and western States, and 250,000 for Australia and Canada. The number of shoe-dealers in Boston is 340.

*California Silver.*—The newly discovered Washoe silver mines, situated on the eastern slope of the Sierra Nevada, are the richest by far in the world, if all the stories are true which have come to us from California. A tun of ore smelted in San Francisco yields $3,600, and it also contains a considerable amount of gold. Some of the ore is of a black color, resembling brown coal.

*Michigan Iron.*—The Wyandotte Rolling Mills Company, near Detroit, have commenced the erection of another large mill at Wyandotte (adjoining the Merchant Mill, and about the same size) for rolling boiler plates of Lake Superior iron, nail rods, railroad spikes, and forging heavy shafts. The mill is to be provided with new and improved machinery, and to be erected with all possible dispatch.

*Stuart's Thread.*—This thread (as we have been informed by those engaged in the sewing-machine business) has superseded all other brands for machine sewing, on account of its great strength and smoothness. It is manufactured in Scotland by Messrs. David Stuart & Co., near Glasgow, from which city almost all the cotton thread employed in our country is imported. There has been a most marvelous improvement effected within five years in the dressing of cotton thread by friction surfaces, whereby it is glazed and made more beautiful and smooth. Paisley, in Scotland, is the most celebrated place in the world for thread manufacturing. The rise of this business dates back to the days of witchcraft, when Christiana Shaw, a famous bewitched girl, became celebrated for spinning fine linen thread, since which time this art has progressed in that town until it has surpassed all others.

*Mineral Discovery.*—A correspondent of the Brockville *Recorder* intimates that a very rich mine has lately been discovered in the front of Yonge, C. W. The vein first opened consisted of very pure nickel. The mine is located on the farm belonging to Mr. Benjamin Bayle, and was discovered by a mineralogist. The work has been pursued to some extent last summer, but will be properly opened this Spring.

*Southern Manufactures.*—A cotton factory, capable of running 2,500 spindles, has just been put in operation at Jefferson City, La., by Mr. L. N. Lane, of New Orleans. For the present it will make only cotton yarns. There are two factories in Iredell county, N. C., at which yarn and cotton osnaburgs are made in large quantities. One is located at Turnersburg, and owned by Mr. Turner; the other at the Eagle Mills, and owned by Messrs. Colvert & Co. There are small cotton factories in Yadkin, Surry, Catawba, Cumberland, and other counties of the same State. In the course of the last four months three of the manufactories in Richmond, Va., have shipped to New Orleans 64 steam engines and sawmills.

*A Great Show.*—The Massachusetts Charitable Mechanics' Association have fixed upon Wednesday, Sept. 12th, for the commencement of their "Ninth Exhibition of American Manufactures."

*Piscatorial Productions.*—The herring fishery in Nemaskit river, according to the Middleborough *Gazette*, yields 300,000 herrings a year, and below Middleborough, on the Taunton river, are thirteen fishing privileges, yielding annually about 26,000 shad and 2,000,000 herrings.

*Speculations in Screws.*—We see it stated that the Eagle Screw Company and the New England Screw Company (both in Providence, R. I.) have united in one establishment under the name of the American Screw Company. Great speculations are made in the transfer of the stocks.

*Statistics of Salt.*—Three-fourths of the foreign salt consumed in the United States is brought from England, though a large portion of it is not produced there. The value of the salt received last year from England was $982,638; that from British West India, $163,212; all other countries, $149,684: total, $1,295,534.

*Coffee Mills.*—It has been stated that the first board coffee mills were made by Job King, of Taunton, Mass., and cost $18 per dozen, and retailed in 1820 at $2 and $2.25 each. Previously the box coffee mill was used.

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## FOREIGN NEWS AND MARKETS.

The *Siecle* publishes an analysis of the woolen trade of France, which it considers a national industry *par excellence*. Prior to the revolution of 1789 the production of woolen cloths in France was estimated at 225,000,000 francs annually; at present it exceeds, in annual value, 500,000,000 francs. The value of the woolen exports from France amounts to 160,000,000 francs, the greatest amount of which comes to the United States. Considering the great amount of exports, the quantity of woolen goods consumed in France is exceedingly small for the number of inhabitants—36,000,000. The native wool of France is obtained from 35,000,000 sheep, five-sevenths of which are inferior breeds and do not yield over 3 lbs. to the fleece; the remaining 10,000,000 yield about 6 lbs. each annually. This supply is inadequate to the wants of the manufacturers, therefore about 78,000,000 lbs. are imported yearly—mostly from British possessions. There are 3,000 woolen manufactories in France, in which 280,000 operatives are employed. The wool imported into it is subject to variable duties, according to its value; it is very high on the finest qualities, and woolen goods of all descriptions are subjected to a really prohibitory tariff. There is about to be a very great reduction in the tariff of the wool and goods imported into France from England, by the recent treaty formed between the two governments.

The astonishing number of 523,000,000 letters were carried through the British Post-office last year, which was an increase of 19,000,000 over the previous year. In the year 1839, when the penny postage system was introduced, there was only 75,000,000. The increase, therefore, is sevenfold in twenty years. The English postage system is a model for all nations. It is the cheapest, the most comprehensive and best managed in the world. It is not possible for letters to be carried so cheaply in America as in England, because the routes are more extensive and the population so sparse in most of the States; but the British money order system might be re-adopted with great benefit to the people. We use the term *re-adopted*; for this system was once connected with our post-office and then disconnected from it about 13 years ago, on account of the peculations which sprung up in the minor post-offices, and which entailed great loss to the government. In England, during 1858, their were no less than $61,000,000 sent through the Post-office by money orders, most of which were in small sums.

In Birmingham the brass and tin workers are very busy and trade is good.

Welsh rails—the kind mostly sent to the United States—are £5 12s. 6d. at Cardiff. Scotch pig iron has greatly advanced, owing to the strike among the makers and the closing of 100 furnaces. It is selling for £3 1s. 6d. per tun. Refined English tin, £138 per tun. Spelter, £21; a rise of 10s. Tin plates are inactive. Banca tin is at £136. English fine tin is not so highly esteemed as Banca in the United States, and yet it sells for £2 per tun higher in England.

## WEEKLY SUMMARY OF INVENTIONS.

The following inventions are among the most useful improvements patented this week. For the claims to these inventions the reader is referred to the official list on another page:—

### ALARM GAGE.

This invention consists in a novel and ingenious system of valves and passages by which steam is admitted to act upon a whistle or other equivalent device to sound an alarm in case of the water getting low or the pressure of steam too high in a boiler; the same whistle serving for both alarms. The patentees of this novel device are George W. Grader, Benj. F. Cowan and A. C. Wurzback, of Memphis, Tenn.

### STEAM VALVE.

This invention (by Addison Crosby, of Fredonia, N. Y.) consists in a valve of the oscillating kind, constructed with an opening through it, and with two opposite faces eccentric to its axis of oscillation and fitted to a seat of correspondingly eccentric form, which contains opposite ports or openings which are covered and closed by the faces of the valve whenever the valve bears upon its seat, such valve when used in a steam engine or other apparatus in which there is pressure of steam or other fluid, being subject, when closed, to just sufficient pressure of steam to keep it tight, but being perfectly balanced as soon as it commences opening, and in all its applications, working entirely without friction between its faces and seat.

### KNIFE HANDLE.

Lucius Carrier, of Worcester, Mass., has patented an improvement in the construction of knife handles, which, although applicable to handles for all cutlery, is more especially designed for large knives, such as the Spanish knife or machete, and the like. The invention consists in having the body of the handle formed of pieces or horn, leather or wood, and covering the same with a single piece of horn, secured in proper position by rivets or bolts.

### TANNING HIDES.

As a green hide becomes dry by the evaporation of its liquids, its flesh surface forms a hard, flinty scale, to relieve the hide of which it has been customary to submit it, during the softening process, to the mechanical action of fulling stocks or frequent and hard hand manipulations, which have, to some extent, the detrimental effect of loosening the small bundles of fibers composing the structure of the hide. Dennis Aldrich, of St. Louis, Mo., has invented a process of softening hides which have arrived at the above condition, known as "flint hides," which dissolves the flinty scale without injuring the texture of the hides; such process consisting in treating such hides successively with diluted acetic acid and a solution of carbonate of ammonia or chloride of ammonium.

### OSCILLATING PISTON ENGINE.

On page 1 of the present volume of the SCIENTIFIC AMERICAN, we published an engraving of a novel oscillating piston engine, which was invented by Mr. Mark Runkel, of this city. The object of our present notice is an improvement made by the same gentleman on his former patent. His engine is now so arranged that the pressure on both sides of the piston is equally balanced, and that no extra friction or wear will take place in the journal-boxes of the piston rod. This engine is particularly adapted for driving propellers on steamboats, as it takes up but little room, and it can be run with great speed. The inventor has secured patents on the same in this country as well as in Europe, through the Scientific American Patent Agency.

## APPLICATIONS FOR THE EXTENSION OF PATENTS.

*Shell-cutter.*—Joel R. Morse, of Lowell, Mass., has applied for the extension of a patent granted to him on the 2d of May, 1846, for an improvement in machines for cutting shell and horn. The petition is to be heard at the Patent Office on the 30th of April next; and the testimony closes on the 16th of that month.

*Plow.*—John M. May, of Janesville, Wis., has applied for the extension of a patent granted to him on the 3d of May, 1846, for an improvement in plows. The petition is to be heard at the Patent Office on the 1st of May next; and the testimony closes April 18th.

*Screw-cutter.*—H.A. Harvey, administrator of T. W. Harvey, late of New York, deceased, has applied for the extension of a patent granted to said T. W. Harvey on the 30th of May, 1846, for an improvement in machinery for cutting screws. The petition is to be heard at the Patent Office on the 14th of May next; and the testimony closes on the 30th of April.

SHIPMENTS OF COPPER FROM LAKE SUPERIOR FOR 1859.—We extract the following statement in regard to the shipment of copper from the *Mining Gazette*, published at Houghton (Portage Lake), Mich.:—"Through the kindness of John S. Blain, Esq., of Eagle River, we are enabled to furnish our readers with full and reliable statistics of the copper shipments from the various districts during the season of 1859:—Eagle River, 1,301 tuns 1,606 lbs.; Ontonagon, 2,610 tuns 21 lbs.; Portage Lake, 1,573 tuns 332 lbs.; Eagle Harbor, 607 tuns 1,482 lbs.; Copper Harbor, 3 tuns 180 lbs.; total, 6,095 tuns 1,621 lbs. This total shows an increase of 149 tuns 320 lbs. over that of 1858; the amount for that year being 5,946 tuns 1,301 lbs."

GREAT MORTALITY AMONG CATTLE.—There is much excitement at the present time, in certain districts in Massachusetts, in consequence of the appearance of a new and fatal disease which has broken out among cattle and is spreading to an alarming extent. It is said to have been introduced by some cows which were imported from Germany, and which arrived at Boston in a very sickly condition. One of them soon died and the disease was communicated to others, causing numerous deaths, and producing great anxiety among the farmers.

## ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING MARCH 6, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

*.* Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

27,338.—Dennis Aldrich, of St. Louis, Mo., for an Improvement in Preparing Hides:

I claim the treatment of hides successively with diluted acetic acid, and a solution of carbonate of ammonia, substantially as and for the purpose specified.

37,339.—John Allison, of St. Martinsville, La., for an Improvement in Cane Coverers:

I claim the boards or planks, A A, with blades, D D, rotary harrow, J, and adjustable harrow, K, attached, the frame, E, provided with the roller, F, scraper, G, and one or more rotary harrows, H I, the whole being combined and arranged for joint operation as and for the purpose set forth.

[The object of this invention is to obtain a machine for covering cane that will, during the operation, pulverize the earth, and cause the seed to be covered with a loose, light and friable mold permeable to air and moisture, and thereby greatly favoring its germination.]

27,340.—John Armstrong, of New Orleans, La., for an Improvement in Steam Boilers:

I claim the combination of the upright water vessels, A A A', horizontal connecting cylinders, B B, and flues, b b, the said vessels, A A A', being arranged substantially as described, that their upper portions may constitute steam spaces, and their lower parts sediment collectors, as set forth.

And in combination with the said upright water vessels, A A A', horizontal connecting cylinders, B B, and flues, b b, I claim the return flues, C C, passing through the said water vessels and connecting cylinders, as specified.

[This invention consists in a novel combination and arrangement of a series of upright water vessels, horizontal connecting cylinders and flues, constituting a very effective and durable boiler.]

27,341.—E. H. Ashcroft, of Boston, Mass., for an Improved Pressure Gage for Steam Boilers:

I claim my improved locomotive engine boiler steam gage, as made with the coiled spring, the chain and lever arranged and applied directly to the diaphragm rod, and the index pointer shaft, in manner and so as to operate substantially as described.

17,342.—J. B. Atwater, of Ripon, Wis., for an Improvement in Rifled Fire-arms:

I claim constructing the barrel, substantially in the manner set forth, to wit, with a diminished number of rifles or grooves, from or from near the center or middle of the barrel to its muzzle, for the purpose of diminishing the friction of the ball, after the powder has exerted its expansive force upon it, as is specified.

27,343,—Francis Baschnagel, of Beverly, Mass., for an Improved Plastic Compound:

I claim combining the powder of leather previously boiled and dried, with a mixture of solutions of glue and tannin to form a plastic compound, which may be modified and treated in the manner substantially as specified.

27,344.—Albion Bean, of Dedham, Mass., for an Improvement in Railroad Car Brakes:

I claim the arrangement and application of the lever weight with respect to the trunk frame, the brakes and the hand windlass, substantially in manner and to operate as described.

I also claim so connecting the two lever weights of the two adjacent truck frames that both be raised by one chain, or its equivalent, applied to either, as set forth.

27,345.—J. H. Bloodgood, of New York City, and M. A. Johnson, of Lowell, for an Improvement in Felting Machinery:

We claim an elastic traversing apron moistened and warmed by steam, and as the sole bed for the material that is being felted, in combination with a revolving vibrating felter, operating in the manner substantially as described for the purpose set forth.

Second, We claim a felting or rubbing surface for felting machines, composed of the end grain of wood and operating as described.

Third, The device for keeping the apron straight upon its roll, consisting essentially of the independent end pieces, S, cord, t, and spring, P, or their equivalents, operating substantially as set forth.

27,346.—J. L. Butler, Wm. L. Hosford, and D. W. Smith, of Brooklyn, N. Y., for an Improvement in Burners for Vapor Lamps:

We claim the construction of the adjustable thimble or jacket, A A, with expansions or ears, a a, and the adaptation thereto of removable heaters, B B, for the purpose set forth.

27,347.—Joshua F. Cameron, of Livingston county, Mo., for an Improvement in Shovel Plows:

I claim the arrangement of the beam, A, standard, B, shovel, C, hinge screw, D, rods, E E, and set screws or pivots, F F, as described, for the purposes set forth.

27,348.—Wm. B. Cargill, of Waterbury, Conn., for an Improvement in Hand Cotton Pickers:

I claim the reciprocating gatherer, arranged and operating substantially as described, whereby I am enabled to keep steadily in contact with the balls, the said gatherer for extracting the cotton, as set forth and specified.

I also claim the combination with the reciprocating gatherer, the stationary stripper for discharging the cotton from the said gatherer, as set forth and specified.

I also claim widening that portion of the gatherer which is always in the case for the more perfect delivery of the cotton to the receptacle, and to prevent clogging within the case, as set forth and specified.

27,349.—Lucius Carrier, of East Douglas, Mass., for an Improvement in Knife Handles:

I claim, as an improved article of manufacture, a knife handle formed of a body or filling of horn, wood, or other suitable material, secured by a single piece of horn, substantially as described.

27,350.—N. R. Carrington, of Cold Water, Miss., for an Improvement in Seed-planters:

I claim the combination and arrangement of the seeding wheel, H, constructed as described, the projecting arms, d d, alternating in action on the opposite sides of said seeding wheel, and the tangential sliding gate, I, substantially as specified, and in combination therewith, the "false floor," L, for adapting the variations of the seeding wheel to different kinds of seed, as set forth.

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### 27,351.—Augustus Conradt, of Philadelphia, Pa., for an Improvement in Forming Hollow Articles of Sheet Metal:

I claim causing the mandrel, A, whilst rotating, to vibrate or move laterally, under the combined influence of the governor, l, pattern, C, and springs, i i, or their substantial equivalents, in the manner and for the purpose set forth and described

I also claim giving the said mandrel, A, whilst rotating, a longitudinal motion, when required, by means of the governor, l, pattern, C, and spring, f, or their equivalents, substantially as and for the purpose set forth and described.

### 27,352.—B. F. Currier, of Bath, Me., for an Improvement in Machines for Cutting-up Cotton Plants:

I claim the revolving knives or cutters, i, and the pulleys, n p, with their band, o, operating substantially as described for the purpose specified.

### 27,353.—J. Daman, of Hartford, Ky., for an Improvement in Machines for Extracting Stumps:

I claim the arrangement and combination of the connecting bar, C D, the rod, l, sliding frames, F G, springs, h j, link, I, and lever, H, as and for the purpese shown and described.

[This invention consists in the employment or use of two rack bars fitted in a suitable framing, and used in connection with sliding catches, and a lever or levers, whereby the desired work, to wit, the extracting or drawing of the stumps from the earth may be effected with facility by a single person or attendant.]

### 27,354.—Henry Disston, of Philadelphia, Pa., for an Improved Method of Securing Handles in Hand Saws:

I claim the application of the taper pins, e e, with the screwed ends, and their nuts, f, to the manufacture of hand saws, in the manner and for the purpose set forth.

### 27,355.—H. Wm. Dopp, of Buffalo, N. Y., for an Improvement in Steam Engines:

I claim, first, The stationary valve balance, B, constructed as described, in combination with steam valves, A A, or their equivalents.

Second, I claim sliding valves, A A, when the same are constructed and used in the manner and for the purpose set forth.

Third, I claim the employment of link, crank or arm, as shown by link, k, in combination with pistons, M M, and valves, A A, as constructed.

Fourth, I claim the combined rocking valve gear, when the same shall be constructed substantially as and for the purpose set forth.

Fifth, I claim the employment of a cam groove around the shaft, J, in combination with hooks, k k.

### 27,356.—Darwin P. Flynn and Richmond S. Hayes, of Le Roy, N. Y., for an Improvement in Corn and Cane Harvesters:

We claim, first, The employment or use of the shafts, f, provided with the spiral wires, E, and the shafts, h h′, provided respectively with the spiral wires, F, and cylinder, i, in connection with cutters, H, arranged to operate substantially as and for the purpose set forth.

Second, The stationary and yielding fingers, l l′, in connection with the shafts, f h h′, provided with the spiral wires and cylinders, arranged for joint operation as set forth.

Third, The movable platforms, I I, provided with the rotary beds, a, in connection with the fingers, l l′, or an equivalent stalk-holding device, for the purpose specified.

[This invention relates to a new and improved machine for cutting standing maize or Indian corn and sugar cane, and gathering the same as it is cut into gavels, so that they may be readily bound by an attendant and cast from the machine as the latter moves along. The invention consists in a novel means employed for gathering and presenting the stalks to the cutters, and also in the means employed for conveying the cut stalks to rotary and intermittingly moving platforms, whereby the desired end is attained.]

### 27,357.—Joseph W. Gardner, of Shelburne Falls, Mass., for an Improvement in Table Cutlery:

I claim an improved manufacture of knife or fork as made not only with a flat or sheet metal shank and with the scales applied on opposite sides thereof, but with two separate semi-bolsters applied relatively to the shank and the scales, and fastened thereto substantially as specified.

### 27,358.—Wm. M. Garee, of Granville, Ohio, for an Improvement in Corn Planters:

I claim the arrangement of the flanch, C, seed slide or charger, m, plate, n, brush block, e, chamber, l l, uprights, 1 2 3, lid, p, and jaws, b b, as and for the purpose shown described.

### 27,359.—Edward W. Gordon, of New York City, and William H. Peckham, of Hoboken, N. J., for Improved Spectacle Temples:

I claim constructing the hollow temples and slides of spectacles with both of the spring stops, e i, substantially as and for the purposes specified.

### 27,360.—H. Gortner and J. McCann, of Nashport, Ohio, for an Improvement in Corn Harvesters:

We claim, first, The hinged frames, G G′ and H, bend, c, roller, D, with cords, F, all arranged, combined and operating in the manner and for the purposes set forth.

Second, We claim the convex knife rest, N, with rotary sickle blade cutters, L, as represented and described, for the purpose specified.

[The object of this invention is to construct a machine which will, as it is drawn through the field of standing corn, cut the same with great facility, two rows at one time, and by which the cut corn stalks can be readily gathered into shocks and left on the field in a fit condition for binding. This invention consists in the employment of a peculiar shaped rotary cutter for giving an oblique draw cut, operated by the driving wheel through the medium of suitable gearing; and it also consists in a novel constructed platform for receiving the stalks as they are cut by the knives, and discharging the same to one side of the machine in a suitable condition for binding in shocks.]

### 27,361.—John H. Gove, of San Francisco, Cal., for an Improvement in Hay Presses:

I claim the cross arms or levers, F F, working in journals upon a movable platform at one end, in connection with the chains or ropes, c c, one end of which is attached to the cross bars, H H, the other fastened to and winding upon a shaft, a.

I claim the arm, n, of lever, m, combined with catch springs, o, as arranged with the crossbar, H′, for the purpose of automatically disconnecting the pressing gear at the proper time, as set forth.

I claim the sliding bar, r, with the hooks, s s, roller, t, and spring, V, for the purpose of releasing the rope or wire, as set forth.

I claim the combination of the shaft, a, chains or ropes, c c, and arms or levers, F F, when operated by the axle of a carriage substantially as described, and for the uses and purposes as set forth.

### 27,362.—John R. Grace, of Brooklyn, N. Y., for an Improved Surf Life Boat:

I claim, first, The employment of a central ballast chamber, c, when combined with two air chambers, b, substantially as shown and described.

Second, I claim the combination of the air chambers, g g, with the ends of boats that are so curved, that, when the boat is capsized, the boat shall be mainly supported upon said air chambers, as and for the purpose shown and described.

Third, I claim the vertical and endwise arching of the chambers, g g, as and for the purpose set forth.

[This invention consists in the construction of surf and life boats of peculiar transverse sectional form and with a novel arrangement of air and watertight chambers, by which some advantages are obtained.]

### 27,363.—W. W. Green, of Chelsea, Ill., for an Improvement in Cultivators:

I claim, first, Having the wheels, c c, of the implement attached to vertical perforated bars, g g, which pass loosely through the back part of the frame, A, in connection with the adjustable draught-pole, B, the whole being arranged as and for the purposes set forth.

Second, Attaching the shares, D, to their standards, j, by means of the sockets, l, plates, q, and bolts, n; the sockets and plates being attached respectively to the shares and standards, and the bolts passing through the sockets, plates and standards; the bolts passing through transverse slots, m, in the sockets, and projections, r, on the plates, the whole being arranged as and for the purpose set forth.

[This invention relates, firstly, to an improved arrangement of means for elevating and depressing the shares, so that the same may, when in operation, be made to penetrate the earth at a greater or less depth as circumstances may require, the arrangement also admitting of the adjustment of the shares above the surface of the earth to facilitate the removal of the implement from place to place. The invention relates, secondly, to a novel way of attaching the shares to their standards, whereby the shares may be adjusted more or less obliquely either to the right or left, as the proper cultivation of the crop may require.]

### 37,364.—George W. Graber, Benjamin F. Cowan and A. C. Wurzbach, of Memphis, Tenn., for an Improved Gage for Steam Boilers:

We claim the arrangement of the hollow water alarm valve, L, and its seat, k, and passages, n l m, in combination with the chambers, C and D, and steam alarm valve, k, substantially as described, to form separate means of communication with the same whistle, or its equivalent, for the water and steam alarms.

### 27,365.—Herman B. Hammon, of Bristolville, Ohio, for an Improvement in Hand Corn Planters:

I claim the arrangement of the seed box, A, sliding front, B, back, C, lid, D, mouthpiece, E, handles, F and G, gage, e, set screw, n, clasps, a′ a″ a‴ a⁗, the crooked finger, 9, branch, 7, pins, X X, the flaring mouth, f, channel, t, measuring cavity, i, brush, r, for joint operation, as described, for the purpose specified.

### 27,366.—A. B. Johnson, of Washington, Ind., for an Improvement in Horse Hay Rakes:

I claim the combination of the lever, J, pawl, K, wheels, I and H, and stop pawl, L, in combination with a double rake, arranged and operating in the manner set forth.

[This invention consists in the employment of a double rake, hung upon a suitable frame or arms which are to be secured to the wheels and axle of a wagon, and capable of turning in its bearings in said frame, and in rotating this double rake so as to alternately bring the tines into operation by a novel device which is placed under the direct control of the driver, which will be understood by the above claim.]

### 27,367.—Jasper Johnson, of Geneseo, N. Y., for an Improved Gate:

I claim the combination of rod, R, guides, a a′, pulley, p, and weighted cords, c, with the gate and posts arranging and operating substantially as described.

### 27,368.—Daniel Kaufman, of Boiling Spring, Pa., for an Improvement in Hog Elevators:

I claim the post or upright, A, provided with the radial bars, a, in connection with the revolving cap, C, with lever, D, attached, the whole being arranged, as shown, to form a new and useful device, for the purpose specified.

[The object of this invention is to obtain a simple device to facilitate the hitherto-laborious manipulation attending the elevating and suspending of slaughtered hogs preparatory to dressing the same, a device that may be operated, if necessary, by a single individual, and thereby not only economize in labor but also greatly expedite the work, even with a less number of hands than is usually required.]

### 27,369.—George W. Keene, of Lynn, Mass., for an Improvement in Boot and Shoe Heels:

I claim uniting the top lift, f, of a boot or shoe heel to the body, A, of said heel by means of an interposed metal plate, c, having points or projections on both of its sides, and which enter the top lift and the body of the heel, and thus secure itself to the top lift and the body of the heel, and each to the other, substantially as described, for the purpose specified.

### 27,370.—James W. Lyon, of Brooklyn, N. Y., for an Improved Machine for Finishing Plugs of Stop Cocks:

I claim, first, Constructing the main bearing surface of a lathe spindle entirely of sharp W grooves, substantially as described.

Second, In combination with a lathe spindle and belt shipper, the friction brake, substantially as described.

Third, In combination with the chuck, the pins, C6, slots, C7, and adjusting screws, C8, substantially as described.

Fourth, The arrangement, in combination with the machine, of the sliding carriage, substantially as described.

Fifth, The arrangement, in combination with the machine, of the system of levers in connection with the treadle and re-acting spring, substantially as described.

Sixth, The arrangement of the parallel mandrels, G4 G5, in combination with the spindle and chuck, and carrying a cutting and tapping tool, substantially as described.

Seventh, The arrangement and mode of adjusting the different parts of the cutting tool, H, substantially as described.

Eighth, The two slide rests, in combination with each other and with the machine, substantially as described, and substantially for the purposes set forth.

Ninth, In combination with the spindle, brake and lever, operating the belt-shipper, the arrangement of the vibrating arm and rotating cutters, substantially as described.

Tenth, The combination of the vibrating arm with the sliding carriage.

Eleventh, The hinged hand rest, in combination with the spindle and bed, A, substantially as described.

Twelfth, The combination of the hinged hand rest with the sliding carriage and treadle lever, substantially as described.

Thirteenth, The arrangement of the internal mandrel and drill, in combination with the spindle and chuck, substantially as described.

Fourteenth, The combination of the internal mandrel and drill with the back slide rest, substantially as described.

Fifteenth, And finally, I claim, in connection with a spindle and chuck suitable for holding the cast plug, and so arranged with relation to the motive power as to be rotated in reverse directions or be held firmly in a fixed position, the cutting tool, H, and tap, the cutting tools, I I′, and the vibrating rotating cutter or cutters, or their equivalents, when arranged substantially as described, so as to successively perform their respective parts of the operation of finishing the plug without removing it from the chuck and to repeat their operations upon each successive plug, substantially as described.

### 27,371.—John Magee, of Lawrence, Mass., for an Improvement in Coffee Pots:

I claim the use of the piston, F, and openings in cylinder as applied to tea and coffee pots, for the purposes described.

### 27,372.—Edward Mattocks, of Lyndon, Vt., for an Improved Shutter Operator:

I claim the described application of the lever, U, to the lever or bar, C, and its arrangement with reference to the sectoral gear, E, and the pinion, G, whereby, by the revolution of the said pinion, the blind may be not only either opened or closed but latched or unlatched, in manner as set forth.

### 27,373.—Hazel Mayhew, Jr., and E. Mayhew, of Lancaster, Pa., for an Improvement in Preparing Coal:

We claim the improvement in making coal better in quality by bringing it into contact with hydrogen, by the mode and manner specified.

### 27,374.—James D. Moore, of Zanesville, Ohio, for an Improvement in Self-loading Fire-arms:

I claim, in combination with a carrying and cut-off plate, C, the movable and stationary magazines, a b, for containing loose powder and balls or short cartridges, and operating together substantially as described.

I also claim, in combination with a semi-rotating breech-piece, H, the plate, C, and magazines, a b, substantially as described.

I also claim the combination of the cam plate, G, and lever, I, for actuating the slide plate, C, at proper intervals, as set forth.

I also claim so connecting the dog with the bolt, c, as that the hammer will not catch or stand at full cock unless the bolt is in its proper position to lock the breech and barrel in line, substantially as described.

### 27,375.—Charles Gustave Mueller, of New York City, for an Improvement in Compositions for Extinguishing Fires:

I claim the described composition of charcoal, sulphur, sugar and red lead, mixed together in the proportions specified, for the purpose of extinguishing fires.

[The object of this invention is to produce a composition which, by the quantity of non-combustible gases emanating from the same when lighted, will serve to extinguish fires in rooms which are partially or entirely closed. It is put up and sold in boxes, which make it convenient to handle and which serve to preserve it against the injurious influence of moisture or heat.]

### 27,976.—Jimpsey B. Netherland, of (near) Louisville, Ga., for an Improvement in Cultivators:

I claim the arrangement of the peculiarly-shaped branched standards, B C, constructed as described, in combination with blades or shovels, constructed as described, and attached to the standards in the manner specified.

### 27,377.—David Newbrough, of Clarksburgh, Ind., for an Improved Churn:

I claim a churn, constructed substantially as described and specified, that is to say, with a cream receptacle, A, brakes, F and H, with gatherer, Q, when these several parts are constructed and arranged for operation conjointly as and for the purposes described.

### 27,378.—John J. Paxson, of Middleton, Ind., for an Improvement in Cultivators:

I claim the attaching of the roller or wheel, F, to an elastic frame, C, connected to the cultivator frame, A, by a bolt, h, and communicating motion to the slide, F, from the shaft or axle, D, by means of cranks, l l, and connecting rods, m m, attached to the ends of the pivoted bar, u, on the slide, F, the whole being arranged as and for the purpose set forth.

[The object of this invention is to obtain a simple, economical and compact device, in which a cultivator and seeding machine are combined in such a way that the cultivator may be used separately or with the seed-distributing device, as occasion may require; the combination and arrangement of parts admitting of a perfect operation of both devices, while the machine is placed under the complete control of the attendant.]

### 27,379,—Worden P. Penn, of Belleville, Ill., for an Improvement in Seeding Machines:

I claim the arrangement of the hoppers, J and I, compartments, R, partitions, F, the false bottoms, D and D′, shafts, E and F, feeding wheels, B and O, all constructed and operated as described.

### 27,380.—Geo. W. Phenix, of New Brunswick, N. J., Improved Washing Machine:

I claim the inclined planes, J J J J, spiral springs, n n, with the rollers and washboards to produce friction in washing, and in combination with levers or treadles, m m, as and for the purposes described.

### 27,381.—John T. Plass, of New York City, for an Improvement in Slide Valves of Steam Engines:

I claim, first, The arrangement, in connection with the follower, C, of the cup, f, spring, G, gland, E, and exterior adjusting screw, f, as and for the purpose shown and described.

Second, The combination of the stuffing-box, D, with the follower, C, and gland, E, as and for the purpose shown and described.

Third, The combination of the openings, h h, in the follower, C, with the openings, i i, in the gland, E, as shown, so that any steam which escapes under the force of the valve, will find exit to the atmosphere, and thus notify the attendant of the leakage and enable him to regulate the adjustment of the valve accordingly.

[This invention consists in the employment of a follower fitted to a stuffing-box in the back of the steam chest, and held against the back of the valve by a set screw with an interposed spring, in such manner as to prevent the action of the steam on the back of the valve to a greater extent than may be desired. It also consists in providing suitable openings in the so-applied follower and in the gland of the stuffing-box, for the escape of any steam that may leak between the back of the valve and the follower for the detection of such leakage.]

### 27,382.—Huntington Porter, of Cummington, Mass., for an Improvement in Hoes:

I claim the arrangement of the peculiarly curved and pointed wings, B, socket, C, and round blade, A, as and for the purposes shown and described.

[This invention consists in forming the hoe blade with a convex cutting cutting edge and two concave cutting edges terminating in sharp points; or in other words, it consists in giving a serpentine cutting edge to the blade, which will work to a much better advantage among young and tender plants.]

### 27,383.—Robert Price, of New York City, for an Improved Combination of Mop and Scrubber:

I claim constructing the handle, A, and cloth frame, D, in such a manner, as described, so as to attach to said handle and frame a scrubbing brush and to the wringing rod a mopcloth, for purposes specified, or any other construction substantially the same, or effecting the same facilities to accomplish the same end.

### 27,384.—Geo. W. Rains, of Newburgh, N. Y., for an Improvement in Slide Valves for Steam Engines:

I claim the combination of the suspended valves, A A′, with the carriage, B, and rollers, c, as and for the purpose shown and described.

[This invention consists in a certain mode of supporting the slide valve or valves of a steam engine by means of a carriage running on rollers upon the valve seat, or on a face parallel therewith, whereby the valve is relieved of unnecessary pressure and friction.]

### 27,385.—John R. Rogers, of Sacramento, Wis., for an Improvement in Centrifugal Seeding Machines:

I claim, first, The arrangement of the rod, H, and the cord, a, in connection with the shaft, E, and wheel, F, the same being used in the manner and for the purpose specified.

Second, I also claim the rrangement of the shaft, E, with the slotted seed slide, C, shaker, c, lever, I, and rod, J, in the manner and for the purpose set forth.

### 27,386.—Samuel P. Ruff, of Weaver's Old Stand, Pa., Improvement in Mill Spindles:

I claim the arrangement, consisting of the vertical shaft, C h i j, grooved plates or blocks, c d B w v, friction roller frames, D E F o, friction rollers, l m n, and axial pin, g, the whole constructed and used together in the manner and for the purpose described.

[This invention consists in arranging the vertical shafts of mills, water wheels, &c., so that all their points of bearing shall come in

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contact with rolling or anti-friction surfaces, and thus much of the power necessarily employed to overcome friction saved. The arrangement appears to be capable of performing all that is claimed for it.]

### 27,387.—Mark Runkel, of New York City, for an Improvement in Oscillating Steam Engines:

I claim the arrangement of the oscillating cylindrical piston, C′, or its equivalent, in combination with the stationary cylinder, A, or its equivalent, constructed and operating substantially in the ma ner and for the purpose specified.

### 27,388.—Thaddeus Scoville, of New York City, for an Improvement in Cultivators:

I claim the arrangement and combination of the side beams, A A, hinged together, the jointed bar, a, connecting the thills, the spur wheels, D D D D, acting both as cultivators and supporters, the convertible cultivating teeth, E E, and the sliding or self-adjusting seat, G, substantially in the manner and for the purpose specified.

### 27,389.—John Adam Scheutz, of St. Louis, Mo., for an Improvement in Anti-rheumatic Liniments:

I claim the compound composed of the aforementioned ingredients.

### 27,390.—James Selby, of Peoria, Ill., for an Improvement in Seed Drills:

I claim the arrangement of the shaft, B, serrated wheel, C, slide, f, bar, F, and cam lever, E, when the same are used substantially as and for the purpose specified.

### 27,391.—Hamilton E. Smith, of Philadelphia, Pa., for an Improved Washing Machine:

I claim the slotted or perforated reel, C, having any convenient number of straight sides when the said reel is arranged to revolve within the water contained in the outer vessel, A, and when it operates in conjunction with the weighted reel or roller, D, as and for the purposes set forth

I also claim the heater, P, with the coiled pipe, F, or its equivalent when combined with the outer casing, A, and the reels, C and D, in the manner and for the purpose specified.

### 27,392.—George K. Snow, of Watertown, Mass , for an Improved Machine for Folding and Pasting Paper:

I claim a machine or combination consisting not only of mechanism for producing a single folding of a sheet of paper, but mechanism which shall operate to produce either one or two further and parallel folds or turns of such paper in an opposite direction, substantially as specified; such mechanism, as shown in the drawings, being the plates, G H C D and E, arranged and made to operate together essentially in the manner and by means as hereinbefore set forth.

And I also claim a combination consisting not only of mechanism for folding a sheet of paper once, and mechanism for producing one or more further parallel folds or turns of the sheet in an opposite direction, but mechanism which shall operate to produce either one, two or three folds of the sheet, at a right or other angle with the line or lines of previous folding of it, such combination of mechanism as exhibited in the drawing, being the plates, G, H, C, D, C′, D′, E, N, O, and R, operated in the manner and by means substantially as heretofore described.

I also claim a combination or machine consisting not only of mechanism for folding a sheet of paper one or more times, but mechanism for applying paste or cement on such part or parts of the sheet as may be required, in order to cause the sheet to stick together at any two or more of its folds or lines of fold; the mechanism shown in the drawings for applying paste being the paste roller, s2, paste fountain, t2, and the wheel, y2, arranged and operated relatively to the platform, B, and the folding plates, substantially as explained.

And, in combination with the receiving trough or spout, S, and the sheet abutment, U, I claim the mechanism or frame, W, for receiving the sheet from the abutment and conveying it toward and pressing it upon either the pack or pack-holder that may be within the trough, S.

And, in connection with the receiving and conveying apparatus or frame, W, applied to the trough, S, and its abutment, U, as described, I claim the application to the abutment of a carriage, V, and a hand lever, Z, or any equivalent mechanism by which such abutment may be moved in a direction away from the sheet-receiver, so as to enable the latter to expel from the machine an imperfect sheet or an imperfectly folded sheet, essentially as specified.

I also claim the arrangement and combination, in the manner described, of the adjustable stop bar, o2, with the two folding plates, G, H, and the plate, E, to run between them.

I also claim, in combination with a paper-folding machine, constructed so as to fold paper or fold and apply paste to it, substantially as described, a heating apparatus so applied as to heat a pack of folded paper while in the machine, the same being to facilitate the desiccation of the pack or paste applied thereto, for the purpose set forth.

I also claim, in a paper-folding machine, the combination of the lifter bar, g2, with the register points, f2, applied to the platform upon which the sheet to be folded is placed.

And I also claim the combination of the slotted plate or bearer, h3, or its equivalent, with a folding plate and a pasting apparatus of the paper-folding machine; the same being to prevent a pasted part of a sheet from adhering to the outer surface of the folding plate.

### 27,393.—C. M. Spencer, of South Manchester, Conn., for an Improvement in Self-loading Fire-arms:

I claim, first, The combination of the rolling breech, E, the lever, G, and sliding locking bolt, F; the whole fitted and applied substantially as set forth.

Second, The slide, H, applied to the rolling breech and operating in combination with the hammer, substantially as and for the purpose specified.

Third, The combination of the serrated projection, n m, the rolling breech, and the tongue, J, applied and operating substantially as described within the opening in the breech-supporter.

[This invention consists in an improved mode of locking the movable breech of a breech-loading fire-arm, whereby it is easily opened and closed, and very firmly secured in place during the explosion of the charge. It also consists in certain contrivances for operating in combination with the movable breech, for the purpose of withdrawing the cases of the exploded cartridges from the chamber of the barrel and for conducting new cartridges thereinto from a magazine in the stock.]

### 27,394.—Thomas Stewart, of Philadelphia, Pa., for an Improvement in Slide Valves for Steam Engines:

I claim the elastic or yielding diaphragm, I, attached to the balance frame, H, and to the steam chest, and arranged in the manner set forth, when the said diaphragm has such an extent of its upper surface exposed to the pressure of steam that while the latter maintains the balance frame in close, steam-tight contact with the valve, the said valve is relieved in a great measure from the pressure of steam, as specified.

### 27,395.—Grey Utley, of Chapel Hill, N. C., for an Improved Head Rest for Travelers in Railroad Cars, Carriages, &c.:

I claim the rest, H, supported by the shoulders of the wearer and having terminations for supporting the wearer's arms, so that the weight thereof shall counteract the pressure of the head against the said rest, substantially as set forth.

### 27,396.—Aaron C. Vaughn, of Johnstown, Pa., for an Improved Churn-dasher:

I claim arranging the shafts of a series of revolving churn dashers longitudinally in the churn box, and connecting them by means of cogged wheels or other mechanical equivalents, when the latter are arranged inside of the churn box and rotate each adjacent pair of dashers in contrary directions, as shown, and when the blades of the dashers in each series incline in contrary directions also, substantially in the manner and for the purposes described.

### 27,397.—Aaron C. Vaughn, of Rainsburg, Pa., for an Improved Mortising Machine:

I claim two nipper jaw cutters constructed and operating substantially as described, for the purpose of cutting a square or oblong mortise in wood; and this I claim whether the cutters be operated or fed up to their work by the mechanical contrivances represented or by any others substantially the same.

### 27,398.—Nicholas S. Vedder, of Troy, N. Y., for an Improvement in Cooking Stoves:

I claim the arrangement of the door or doors, f f′, of the oven, A, directly opposite to the side or sides, h h′, of the fire-box, and of the most capacious and effective portion of the oven, as and for the purpose set forth, the smoke flues being extended from the fire-box along the top, c, end or ends, d d′, and bottom, e, of the oven, substantially as described.

### 27,399.—J. M. Wampler, of London county, Va., for an Improvement in Breech-loading Fire-arms:

I claim, first, The double catch, X and K, which holds down the breech and at the same time holds the rear end of the trigger-guard, both being relieved by one pressure of the finger in the act of pulling down the guard to raise the breech for loading.

Second, The peculiar construction set forth whereby the percussion bar is forced back and locked to a short half cock or safety catch, sufficiently far to clear the cap, cartridge or breech; this being done by the same pressure of the finger that frees the double catch and the trigger-guard.

Third, The rock lever, P, for freeing the percussion bar from its half cock at the instant of full cocking.

Fourth, The back sight, Y, constructed and operated as described, for the purpose specified.

### 27,400.—Henry Waterman, of Haverhill, Mass., for an Improved Apparatus for Hoisting Water:

I claim the trough, D, around the well curb, in combination with the self-discharging bucket, H, when operated substantially as set forth.

### 27,401.—E. D. Williams, of Philadelphia, Pa., for an Improvement in Solidified Fuel from Coal Dust:

I claim compounding and preparing a solidified fuel from coal dust, peat, and other like substances, by mixing the same with glutinous paste, subjecting the composition to pressure in molds, and subsequently drying the condensed blocks, as set forth.

### 27,402.—F. O. Wilson, of Mount Olive, N. C., for an Improvement in Cultivators:

I claim the double mold turn plow, F, and the side turn plows, H H, in combination with the beam, A, middle stock, E, cross frame, D, and side stocks, G G, when said beam, A, and middle stock, E, shall be braced and supported by the stay, C, and the other parts constructed and arranged substantially as and for the purpose specified.

### 27,403.—Joseph Woodruff, of Rahway, N. J. for an Improved Steam and Fire Regulator:

I claim, first, The disks or diaphragms, B and C, connected together so as to form a double diaphragm, constructed and operating substantially as set forth.

Second, The clamping rings, D, when applied to diaphragms, for the purpose of making a steam or air tight joint.

Third, The concave cup or bearing, G, for supporting the lower diaphragm, when about the size of the standard or bearing, F.

Fourth, The hollow packing screw, K, constructed as described, and operating in the manner set forth.

Fifth, The double adjustable clevis and yoke, I, in combination with the standard, F, and lever, H.

### 27,404.—Austin Woolfolk, of the Parish of Ibeville, La., for an Improvement in Ditching Machines:

I claim, first The combination of the inclined excavator wit an adjustable throat plate or its equivalent, so arranged as to prevent the earth from breaking and deliver it in a sheet to the carrying band.

In combination with the excavator, I claim the adjustable sloper jointed to the side of the excavating plow, substantially as described for the purpose set forth.

Third, In combination with the inclined excavator, I claim the continuous carrying band arranged across the end of the inclined plane and extending outside the same and at right angles thereto, to receive the earth, substantially as described.

Fourth, Arranging the joint pivot of the frame of the continuous carrying band extending across the end of the excavator, substantially as described, so as to prevent the inclination of the band being changed at the rear of the inclined excavator, when the inclination of the band is varied outside of the frame of the excavator.

Fifth, The combination of a carrying band with a pressure roller arranged substantially as described, to compress the earth on the band so as to form a continuous sheet for the purpose set forth.

### 27,405.—Wm. Chadwick, of Bury, England, assignor to himself and Wm. Griffiths, of Philadelphia, Pa., for an Improvement in Ventilators. Patented in England May 28, 1858:

I claim the combination of the spiral vanes or worms, d, with the screw vanes, b, standard, c, and case, a, when the same are arranged without any partition between the vanes, d and b, and without any casing around the vanes, d, but in the manner and for the purpose specified.

### 27,406.—Robert Craig (assignor to himself and J. W. Ludlow), of State Line City, Ind., for an Improvement in Cultivators:

I claim the employment or use of the curved beveled keys, F, interposed between the shares and their feet, and secured by the same bolts, d, which attach the shares to the feet, as and for the purpose specified.

[This invention consists in the employment of bevel keys interposed between the feet of the implement and the shares, for the purpose of adjusting the latter in oblique positions to the right or left, so as to throw the earth outward from the implement or inwards towards its center, as circumstances may require. The object of the invention is to adapt one and the same implement for the various kinds of work required in the cultivation of crops.]

### 27,407.—Henry Eastman (assignor to D. Henderson), of Indianapolis, Ind., for an Improvement in Horse Hay Rakes:

I claim the arrangement of the toothed rake heads, A P, triangular frame, D1 D2 D3, axle, C, hand lever, B, arm, F, friction roller, G, and catch, H, substantially in the manner and for the purpose described.

### 27,408.—W. A. Flanders (assignor to himself and T. W. Boyce), of Cleveland, Ohio, for an Improvement in Beehives:

I claim, first, The combination or the triangular reversible comb frame or comb frames, B B, and the angular adjustable case or chamber, A, or their equivalents arranged substantially in the manner and for the purposes set forth.

Second, I claim the mechanism or means arranged substantially as described, or their equivalents, by which I am enabled to adjust or place the embryo brood contained within the hive or in the frames above or nearly above the feeding swarm in the manner and for the purposes specified.

Third, I claim the improvement in the comb guide consisting of the wire saddle, D, hooks, D′, and glass plate, D″, or their equivalents, constructed and applied in the manner and for the purposes specified.

Fourth, As an improvement in moth traps I claim the hinged wings, O O, in combination with the central inclined plane, N; the several parts being constructed and arranged in the manner described for the purposes set forth.

Fifth, I claim the drone separator, H, provided with the passages, J J, when used in combination with the wings, I I, substantially as set forth for the purposes specified.

### 27,409.—George H. Horn (assignor to himself and Edwin B. Horn), of Boston, Mass., for an Improvement in the Needle-holder of Sewing Machines:

I claim my improved device or mechanism for holding and adjusting the needle, it being composed of the secondary socketed holder and its ball and supporting socket, applied to the needle-carrier and having a device or devices for clamping the ball to the carrier, substantially as specified.

And in such I also claim making the ball needle-holder with the split or slit in its ball, substantially as described, and so as to co-operate with the clamping screw or device and cause it to clamp both the needle and the needle-holder, at one and the same time, as described

### 27,410.—Gibbons L. Kelty, of New York City and T. G. Harold, of Brooklyn, N. Y., assignors to R. H. Kelty, of New York City, for an Improved Curtain Fixture:

We claim, first, A head or center pin, d, on which the roller revolves, combined with the metallic bracket, c, substantially as specified, whereby the roller is prevented from becoming disconnected by end motion to the roller or looseness of the bracket, as set forth.

Second, We claim the combination of the center pin provided with a head, with the spring, g, that acts to draw the head of the center pin to the bracket, as set forth.

Third, We claim confining the blind cord by means of two flat or nearly flat surfaces that are pressed towards each other by means of a spring, when one of those flat or nearly flat surfaces is stationary and the other is attached to the shade or curtain roller whereby the said roller can be revolved or will remain in any position to which it may be turned, as specified.

### 27,411.—Walter J. F. Liddell (assignor to himself and Benjamin Hershey), of Erie, Pa., for an Improvement in Car Springs:

I claim so connecting or suspending the yielding part of a car or carriage to the unyielding part thereof by springs arranged vertically as that the weight or force applied thereto shall elongate or extend said springs longitudinally or in the direction of the applied force and their removal allow the said springs to contract in that direction, substantialty as described.

### 27,412.—Alvin R. Paine (asignor to John M. Myers, of New York City), for an Improvement in Sewing Machines:

I claim, first, The clamping segments, g g, within the ring, 1, of the feeding wheel, when said segments are formed with the flat side or removed portion, 2 2, for the purposes and as specified.

Second, I claim the combination of the vibrating lever, h, and segments, g g, when the segments are formed with the cam-shaped openings, 3 3, at their centers, acted on by the block, of the lever, in the manner and for the purposes specified.

### 27,413.—Septimus C. Stokes (assignor to himself and Benj. S. Stokes, of Manchester, N. H.), for an Improved Knife-sharpener:

I claim the combination and arrangement of two cylindrical or other files or bars, A B, with a frame or holder, C, and a clamp, substantially as and for the purpose described.

And, in combination with the two rods or bars, A and B, and a frame or holder, C, arranged with respect to each other substantially as specified, I claim the gages or guides, F G, arranged relatively to the said bars essentially in manner and for the purpose as set forth.

I also claim the combination and arrangement of the projecting rest, D, with the two crossed bars, A B, and their holder, C, provided with a handle, as specified.

### 27,414.—Henry Wright, of Cambridge, Mass., assignor to Wm. C. McClerland, of Springfield, Mass., for an Improvement in Wooden-soled Shoes:

I claim the new manufacture of boot or shoe described, viz.: a boot or shoe with a wooden sole, having the tops or upper fastened to the sole in a proper manner by pegs, nails or screws passing through a portion of the wood of the sole and through the upper or edge of the top, and into the wood work of the sole again, substantially as set forth.

## RE-ISSUES.

### The Newark Patent Hosiery Company of Newark, N. J. (assignees through mesne-assignments of Henry Burt), for an Improvement in Knitting Machines. Patented Sept. 23, 1843; re-issued Sept. 23, 1847; and again re-issued Feb. 28, 1860:

I claim the combination with a knitting machine, which is capable of producing a fabric of uniform width, of a pattern cylinder or other equivalent governing device, having upon it a pre-arranged pattern in such manner that said device shall control automatically the formation of more or less stitches or loops as the work progresses, whereby variations in the width of the fabric may be effected in accordance with said pre-arranged pattern, as set forth.

### The Newark Patent Hosiery Company, of Newark, N. J. (assignees through mense-assignments of Henry Burt), for an Improvement in Knitting Machines. Patented Sept. 23, 1843; re-issued Sept. 23, 1847; and again re-issued Feb. 28, 1860:

I claim the mechanism for "narrowing and widening," the same consisting of the movable stops, a2 a2, combined with a rack of teeth or other suitable contrivance formed upon the shifting bar, and acting upon the carriage, O, of the yarn guide, as set forth.

Also, the top rack, k, combined with the tube, S, of the yarn guide, and actuated in the manner and for the purpose as set forth.

Also, The mechanism which effects the changes of the clutches, the same consisting of the shifting bar, the arbor, u2, having a circular depression and radial recesses in its head, and levers and other parts connected to the same, and connecting the same with the clutches; the whole being arranged and operating substantially as specified.

Also, the stationary roller, y′, and the projections, t3 w3, and their intervening curve formed upon the shifting bar, in combination with the spring, S3, the toggle bars, and also in combination with the rail, t′, and its depressions; the whole being for the object as described.

Also, the cloth bar, c′, arranged and operating in the manner and for the purpose as set forth.

Also, the particular method by which the depressing bar, c, is carried and forced down upon the pointed ends or barbs of the needles, in order to pass them into the grooves in their shanks, viz.: by a combination of bent levers, f2 g2 h2, and arms, i2; the same being actuated substantially as described.

Also, the manner of raising the stitch hook, viz.: by an elevating plate, y, through which they extend, and which is combined with and operates them, as set forth.

Also, the method of cleaning the point or lower end of the yarn guide from the depressing bar when the latter descends upon the needles, viz.: by a ledge, b, on the said bar, in combination with the roller, a, applied to the T piece of the yarn guide; the whole being as specified.

Also, the method of clearing the point of the yarn guide from the stitch hooks when the roller, r, passes by the thread guide, or as soon as the lateral motion of the thread guide is stopped, viz.: by the beveled edge, k″, in combination with the screw or other contrivance of similar character projecting from the T piece of the yarn guide.

Also, the mode of adjusting or regulating the distance to which the points of the needles shall retract, viz.: by the movable curved pieces, o2 p2, making part of the cam, m2; the same being arranged and operating substantially as explained.

Also, the combination of the mechanism being the arm, q, and shaft, o, supported by pivots, p p, which sustains and carries the roller, r, of the depressing and elevating bar, v, raised and depressed by machinery, substantially as described.

### John G. Forbes and R. Squires (assignees through mesne-assignments of A. D. Fisk), of New York City, for an Improvement in Coffins. Patented Nov. 14, 1848; re-issued March 6, 1860:

I claim, first, The manufacturing of coffins of cast or raised metal, when made substantially in the form and manner described, that is to say, corresponding nearly with the human form, and making the

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coffin in two parts or shells, united by a flanch, substantially as set forth.

Second, The manufacture of coffins of raised or cast metal in two shells, each formed with recesses of greater or less depth, which shall respectively constitute a portion of the receptacle of the corpse, thus approximating the coffin more nearly in shape to that of the human body than could otherwise be done.

[The advantages of air-tight coffins are very manifest, but the difficulty of making them of metal has been the great weight of the material. This difficulty could, of course, be overcome only by making the plates very thin; and it is the purpose of this invention to so fashion the plates as to combine the requisite strength with a reasonable degree of lightness. The coffin is made of two shells, united by flanges extending around the coffin about midway between the top and bottom, the flanges bolted together, and the seam made air-tight by iron cement.]

### Charles H. Morgan, of Clinton, and L. Whitney, Jr., and S. Priest, of Watertown, Mass. (assignees through mense-assignments of Benj. F. Rice), for an Improvement in Machines for Making Paper Bags. Patented April 28, 1857; re-issued March 6, 1860:

I claim the machine as a whole, composed of mechanism for forming, feeding, cutting and pasting the tube or bag, combined, arranged and operating substantially as described.

I also claim the use of a supporting bar, or its equivalent, around which paper may be formed into a tube, and in connection with which the said paper tube may be severed; each and the whole substantially as described.

I also claim giving the paper the variable feeding motion, for the purpose and in the manner substantially as described.

I also claim cutting the paper, without waste of material, into such a form as shall have suitable projections for the formation of the bottom lap or seam of the bag, and for the convenient opening of the bag at the mouth, substantially as described.

### Addison Crosby, of Fredonia, N. Y., for an Improved Valve for Steam Engines. Patented August 30, 1859; re-issued March 6, 1860:

I claim the oscillating valve constructed with an opening right through it, and with two eccentric faces, and fitted to a double seat of correspondingly eccentric form, which contains opposite ports or openings that are covered and closed by the faces of the said valve whenever the said valve is in contact with the said seat, substantially as described.

### D. W. Crocker, of Deposit, N. Y., for an Improvement in Railroad Chairs. Patented Jan. 25, 1859; re-issued March 6, 1860:

I claim the construction of the chair, as shown and described, so that the passing weight will cause the jams of the chair to gripe the rails, as and for the purpose shown and described.

[This invention consists in constructing a railroad chair with each jaw of a separate piece of metal, and so applying it to the rails at a joint that the downward pressure produced upon the chair by the locomotives and cars passing over the joint will tend to draw the jaws toward each other, and to make them gripe the rails more firmly, thereby causing the ends of the rails to be so confined together that they cannot be displaced vertically or laterally relatively to each other, and making a very rigid and durable joint.]

### Edward Hall and Joseph L. Hall, of Cincinnati, Ohio, for an Improvement in Fire-proof Safes. Patented August 21, 1849; re-issued March 6, 1860:

We claim, first, The employment of hydraulic cement, in whole or in part, as forming the insulating medium or admixture used between the outer and inner cases of safes and chests, when said inner cases are formed of iron or other suitable metal, substantially as described for the purposes set forth.

Second, Joining the outer and inner metallic cases of safes and chests by means of the door frame, c, and flange, b, or their equivalents, when said hydraulic cement, in whole or in part, is used as the insulating medium between said metallic cases, as described, and also by means of the anchors or bolts, d, extending from the outer and inner cases, and into the space between said cases, substantially as and for the purposes set forth.

### Ephraim Brown, of Lowell, Mass., for an Improved Burglar's Alarm. Patented Oct. 31, 1854; re-issued March 6, 1860:

I claim the making of the knob of a drawer movable, and so combining it with an alarm apparatus as to cause an alarm to be sounded whenever an attempt to open the drawer by pulling on the knob is attempted.

I also claim the combination of the latch or spring bolt or the secondary bolt, and key or lever, with the movable knob and the drawer; the same being to operate together as specified.

I also claim combining the alarm pawl, m, with the knob rod by means of a movable hanging lever, u, to be operated or moved by a stud, or its equivalent, fixed in the knob rod.

I also claim the combination of a decoy key or an auxiliary alarm-springing mechanism with an alarm-giving apparatus, its springing device and a latching or belting apparatus applied to a drawer, or its equivalent; the said decoy key or auxiliary alarm-springing mechanism, when put in motion, operating to set in movement the said alarm-giving apparatus, so as to cause it to sound an alarm, as it would be caused to do by reason of any movement of its main springing device.

I also claim connecting the decoy key with the hanging lever so as to operate as specified, also connecting the said hanging lever to the secondary lever, so that a forward pull on the secondary lever shall move the hanging lever so as to effect the sounding of the alarm.

I also claim the combination of the counter or numbered wheel, and its operative mechanism, with the knob rod, the same being to exhibit the number of the attempts at opening the drawer; meaning also to claim the so combining the operative mechanism of the counter wheel with the hanging lever that a movement of the latter will effect a movement of the said wheel.

### E. H. Augamar, of New Orleans, La., for an Improvement in Mode of Staying Piles for Wharves, Piers, &c. Patented July 12, 1859; re-issued March 6, 1860:

I claim, first, The linked frame, S S, constructed and operating as described for the purpose specified.

Second, In combination with piles, as described, the sleeves, a, and braces, b, constructed and operating substantially as specified.

#### ADDITIONAL IMPROVEMENTS.

### Harry H. Evarts (assignor to himself and Phineas E. Merrihew), of Chicago, Ill., for an Improved Machine for Sawing Staves from the Bolt. Patented May 27, 1859:

I claim the use of the rotating block carriage, as described, in combination with the saw, H, as shown and for the purposes set forth in the specification.

### John Huston, of Ottawa, Ill., for an Improvement in Seeding Machines. Patented Jan. 19, 1858:

I claim the arrangement of the stop bar, N, shares, C, spout tube, E, slides, d d, levers, F G I, rockshaft, H, scrapers, M, and rollers, B, as and for the purposes set forth and described.

[The object of this improvement is to facilitate the dropping operation or the distribution of the seed, and also to provide against the contingency of the adhering of the seed and other substances to the pressure rollers; and, further, to control the upward movement on using the machine where the plow shares are raised out of the earth.]

### E. H. Augamar, of New Orleans, La., for an Improvement in Mode of Staying Piles for Wharves, Piers, &c. Patented July 12, 1857; re-issued March 6, 1860:

I claim, first, The constructing and arranging of the giant steam pile-driver boat and its driving frames, as and for the purpose set forth, or in any equivalent manner for the same purpose.

Second, The diagonal bracing of piles in deep water by the means described, or by any equivalent contrivance for the same purpose, and in the manner specified (Figs. 1, 2, 3 and B).

Third, Preventing the abrasion of the soil at the foot of the piles, and between them, by the means specified by any equivalent contrivance for the same purpose (Figs. 1 and B).

Fourth, Laying down the bottom crosstie, by the means, in the manner and for the purpose specified, or by any equivalent contrivance for the same purpose.

Fifth, The combination of the whole arrangement and modus operandi, as described and specified, or any equivalent arrangement for the same purpose.

## Notes & Queries

**J. W. S., of Conn.**---We do not know what pressure of the carbonic acid gas is employed for charging the dough by the company which makes effervescent bread. About seven pounds on the square inch should be sufficient for the purpose.

**S. T. W., of C. W.**---The application of brakes, by which the wheels are arrested from revolving and made to slide on the rail, is the most efficient for quick stoppage, but is most destructive of the permanent way. This action of brakes, we believe, is the most safe because the most efficient.

**J. N. H., of Ga.**---We have heard of California yeast-moss, but have never seen any of it. If you have any of it send us a sample, so that we may call attention to its peculiar qualities.

**N. A. P., of N. C.**---The sulphate of zinc is not so poisonous as the sugar of lead. Brown japan is made with copal varnish, colored to the shade you desire. Gum shell-lac must be heated until fusion takes place, then boiling linseed oil is poured upon it, so as to make an oil varnish. Gum copal is better, however.

**A. Y., of N. J.**---It is allowable to make a model or machine in England of any patented invention and bring it to this country.

**E. L. P. and T. A. L., of N. Y.**---If you cast the bars of your fire grates with a groove in the upper surface of each, they will endure much longer and will not warp so readily. If cast hollow and the feed water to your boiler allowed to flow through them, they will last three times longer and save considerable fuel by the extra heat imparted to the water.

**M. R. L., of Tenn.**---A drop of clear glass, like a bead, carefully set in a lead or brass plate, will make a very good single microscope. A drop of any transparent gum, or pure water, if you could set it, would answer the same purpose. The small hole made in a dark colored sheet of paper with the prick of a pin is also a microscope, and enlarges objects. You do not require to take insects to pieces, unless for dissecting purposes, when examining them with a microscope. We are much mistaken if you do not make a very good microscope with these instructions.

**A. K., of Ill.**---We do not believe there is any loss of power (aside from that of friction) occassioned by what are called the "dead points" in the crank motion. We have been frequently told there was about 21 per cent of power thus lost, but when we asked the question "Where does it go?" it always struck the person interrogated dumb as an oyster.

**W. S. M. D., of Mass.**---We have seen coal oil that was perfectly odorless, and have made it so ourselves; but the process was rather expensive for common use. The method by which you have accomplished the object would be very interesting and useful information to the public if you saw fit to publish it.

**H. J. B., of Pa.**---You cannot obtain a patent for depositing alloys by an electric battery, because this has been done (though not very successfully) by others. There may be some point of great value in your process that is patentable. We do not know of any other method of making Bunsen negative carbon plates, than by mixing the carbon with flour paste. The plates should be thoroughly dried before they are used.

**D. M. B., of Ill.**---There is no peculiar work devoted to petrefactions. You will find the information you desire, we think, on this subject in Lyell's "Geology."

**W. J. L., of N. Y.**---If any treatise on astronomy does teach that the sun passes through 360° of the ecliptic in a tropical year it is very manifestly an error, as you say. It is 50″ less than 360°.

**S. D. S., of N. Y.**---The substance which you send us is not gold, but yellow mica.

**H. W. O., of Conn.**---Ladders have been made to join together in sections as you suggest.

**W. P. W., of ——.**---It is very common to exhaust steam into water for the purpose of heating the water before it is forced into the boiler.

**E. S. W., of Ill.**---The gross pressure upon steam must be doubled to reduce its bulk one half. Steam at 50 lbs. above the atmosphere would be under a pressure of 65 lbs.; double its volume, its pressure would be 32½, and at 16¼ it would occupy four times the space, provided it were confined in a close vessel. If it were allowed to escape into the open air it would expand just as much as if it escaped into a vacuum.

**B. R., of N. Y.**---Your questions are so numerous that we have not space for intelligible replies to them all. We suggest to you, as the shortest way to understand all these matters, to make a thorough study of the sciences of chemistry and natural philosophy. You will find them very interesting.

**G. H. F., of Conn.**---The $20 paid as government fee in a caveat may be applied towards the full fees in an application for a patent on the same invention at any time, even after the caveat has expired; but the amount cannot be transferred towards the government fee on any other invention than the one on which it was first paid.

**J. P. P., of Mass.**---The gas which causes the "pop" in champagne is carbonic acid, generated by the decomposition of sugar in the process of fermentation. The wine is allowed to ferment about 15 days, when the casks are closed with tight bungs. In the mouth of January the wine is racked off and clarified with isinglass. In May it is bottled, when about three per cent of syrup is added, made of sugar candy dissolved in wine. The bottles are placed with their necks inclined downward to allow the sediment to settle in the neck, when, by a dexterous withdrawal of the cork for an instant, this sediment is blown out by the pressure of the gas. This process, preceded each time by the fining operation, is sometimes repeated several times. This, accompanied by the breaking of the bottles, which not unfrequently amounts to 40 per cent, must always make champagne expensive.

### Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, March 10, 1860:—

C. J. F., of Iowa, $25; H. H. A., of Iowa, $30; C. R. A., of Conn., $90; D. S. H., of Ill., $25; B. W. B., of Wis., $30; J. A., of Pa., $30; E. B. C., of ——, —; J. H. & A. T. G., of N. Y., $20; L. C. R., of N. J., $25; M. V., of Ga., $30; A. K., of Ill., $15; S. S., of Mass., $25; A. O., of N. H., $25; J. W. C., Jr., of Ill., $55; S. H. H., of R. I., $30; G. F., of Ill., $30; E. M., of N. Y., $25; J. G., Sr., of R. I., $30; H. & M., of Ohio, $30; J. L. H., of N. Y., $25; J. H., of Ga., $25; J. M. W., of L. I., $25; J. G. C., of N. Y., $23; I. H., of Ill., $25; D. H., of Mass., $30; M. A. H., Jr., of Ill., $30; P. C., of Conn., $25; S. T. S., of Mass., $50; S. S. G., of N. Y., $30; C. & F., of Cal., $55; G. W. B., of Mass., $30; J. C C., of Conn., $25; C. A. B., of Vt., $30; D. J. V., of Ill., $25; W. & T., of Ill., $30; E. H. B., of N. Y., $30; H. A. H., of N. J., $30; A. S. & D. M., of Ill., $30; D. T., of Mass., $10; F. A., of Mass., $30; J. M. H., of Cal., $20; G. K. B., of N. Y., $25; J. L., of N. Y., $25; A. L., of N. Y., $25; G. F. L., of N. Y., $35; I. P. F., of N. J., $25; S. T. McC., of Ga., $30; H. A. J., of Mo., $25; A. M. B., of Vt., $30; J. L., of N. J., $30; W. S., of Ill., $25; D. M., of N. B., $12; S. McG., of Iowa, $25; G. S., of Mass., $30; R. & S., of Vt., $250; P. & McE., of Tenn., $25; E. B. R., of N. J., $10; A. K. T., of Mich., $30; J. G. R., of Maine, $30; J. W. M., of N. Y., $30; H. W. W., of Mass., $30; C. S. L., of Ind., $25; R. I. H., of Ohio, $30; E. B. W., of Ill., $25; D. N., of Iowa, $25; L. K. S., of Conn., $110; R. W., of Ill., $36; I. R., of N. Y., $55; J. R. H., of Conn., $30; C. J., of Mo., $40; D. S. McK., of N. Y., $25; F. R. L., of N. Y., $30; J. R. T., of N. Y., $30; C. O., of N. Y., $25; J. S., of N. Y., $30; M. M., of Ill., $30; J. B. S., of Tenn., $25; J. J. U., of La., $50; J. B., of Mass., $30; J. H. P., of Iowa, $30; C. H. W., of N. Y., $43; J. G., of La., $30; W. C. M., of N. Y., $12.

### Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, March 10, 1860:—

L. E., of Mich. (3 cases); C. J. F., of Ill.; D. McK., of N. Y.; P. M., of La.; I. H., of Ill.; W. S., of Ill.; C. H. W., of N. Y.; J. B. L., of Tenn.; A. H. S., of N. H.; C. J., of Mo.; J. L., of N. Y.; D. D., of N. Y.; I. P. F., of N. Y.; R. H., of Mass.; J. C. C., of Conn.; J. C., of N. Y.; S. M M. G., of Ind.; T. R. T., of Ohio; J. M. W., of N. Y.; J. H., of Ga.; D. J. V., of Ill.; J. S., McC., of L. I (3 cases); C. S. L., of Ind.; J. L., of N. Y.; S. C. T., of Ga.; L. C. R., of N. J.; E. B. W., of Ill.; P. C., of Conn.; G. K. B., of N. Y.; S. H. H., of R. I.; A. O., of N. H.; G. F. L., of N. Y.; G. W. D., of N. Y.; R. & McE., of Tenn.; J. L. H., of N. Y.; D. N., of Iowa; A. L., of N. Y.; M. & C., of N. Y.; E. M., of N. Y.; D. S. McK., of N. Y.; I. R., of N. Y.

### Literary Notices.

THE WESTMINSTER REVIEW.—Published by Leonard Scott & Co., No. 57 Gold-street, this city.—This quarterly periodical maintains its old excellence. Among the feast of good things set before us, in the number for February, may be mentioned the articles headed "Government Contracts," "The Realities of Paris," "Ceylon," "The Social Organism," "Sicily as it Was and Is," "Christian Revivals," "Italy and the Designs of Louis Napoleon," and "Co-temporaneous Literature."

NOTES ON NURSING.—We have received from the publishers, Messrs. D. Appleton & Co., of this city, a copy of this useful work, by Florence Nightingale. It is full of practical suggestions as to the proper care of children and the sick, from one who has a right to speak on such subjects. The authoress signalized her heroic devotion to suffering humanity by visiting the Crimea in 1855, and attending upon the sick and wounded soldiers. We heartily commend this work, not only to professional nurses, but to all heads of families.

THE COURTSHIP AND ADVENTURES OF JONATHAN HOMEBRED.—Dick & Fitzgerald, publishers, New York.

TEN THOUSAND WONDERFUL THINGS.—Dick & Fitzgerald, publishers, New York.

### HINTS TO OUR READERS.

TO NEW SUBSCRIBERS.—Back numbers to commence the volume.—As most subscribers to this paper desire the back numbers to render their volumes complete for binding, we shall continue to send the back numbers to January 1st (the commencement of Vol. II, new series), unless the person ordering the paper instructs us to the contrary, at the time of making the remittance. Should the person sending for the paper desire his subscription to commence at the time he makes his remittance, or at any other period, he can be accommodated, as we are constantly re-printing back numbers from our electrotype plates, and can supply as many of any number as may be desired, up to a million of copies; in fact we have printed over 70,000 copies of a single number—such has been the demand for back numbers.

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## IMPORTANT TO INVENTORS.

THE GREAT AMERICAN AND FOREIGN PATENT AGENCY.—Messrs. MUNN & CO., Proprietors of the SCIENTIFIC AMERICAN, are happy to announce the engagement of HON. JUDGE MASON, formerly Commissioner of Patents, as associate counsel with them in the prosecution of their extensive patent business. This connection renders their facilities still more ample than they have ever previously been for procuring Letters Patent, and attending to the various other departments of business pertaining to patents, such as Extensions, Appeals before the United States Court, Interferences, Opinions relative to Infringements, &c., &c. The long experience Messrs. MUNN & Co. have had in preparing Specifications and Drawings, extending over a period of fourteen years, has rendered them perfectly conversant with the mode of doing business at the United States Patent Office, and with the greater part of the inventions which have been patented. Information concerning the patentability of inventions is freely given, without charge, on sending a model or drawing and description to this office.

Consultation may be had with the firm, between NINE and FOUR o'clock, daily, at their PRINCIPAL OFFICE, No. 37 PARK ROW, NEW YORK. We have also established a BRANCH OFFICE in the CITY OF WASHINGTON, on the CORNER OF F AND SEVENTH-STREETS, opposite the United States Patent Office. This office is under the general superintendence of one of the firm, and is in daily communication with the Principal Office in New York, and personal attention will be given at the Patent Office to all such cases as may require it. Inventors and others who may visit Washington, having business at the Patent Office, are cordially invited to call at their office.

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A pamphlet of information concerning the proper course to be pursued in obtaining Patents through their Agency, the requirements of the Patent Office, &c., may be had gratis upon application at the Principal Office or either of the Branches. They also furnish a Circular of Information about Foreign Patents.

The annexed letters from the last three Commissioners of Patents we commend to the perusal of all persons interested in obtaining Patents:—

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CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

Messrs.. MUNN & Co.—Gentlemen: It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully,

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A MESSIEURS LES INVENTEURS—AVIS IMportant.—Les inventeurs non familiers avec la langue Anglaise, et qui prefereraient nous communiquer leurs inventions en Francais, peuvent nous addresser dans leur langue natale. Envoyez nous un dessin et une description concise pour notre examen. Toutes communications seront recues en confidence.

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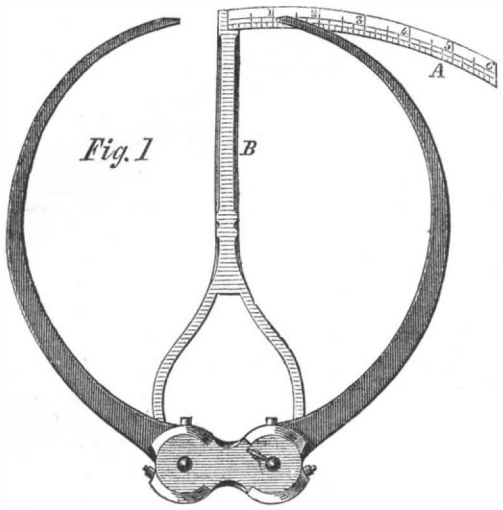
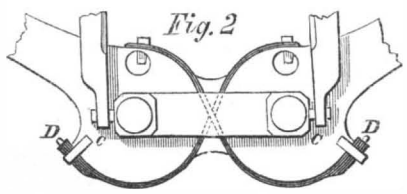
## SUTTON'S IMPROVED CALIPERS.

The annexed cut illustrates a contrivance for attaching a scale to calipers for the purpose of measuring either the whole or half of the opening or separation of the legs, and thus indicating the diameter or radius of the object embraced by them.



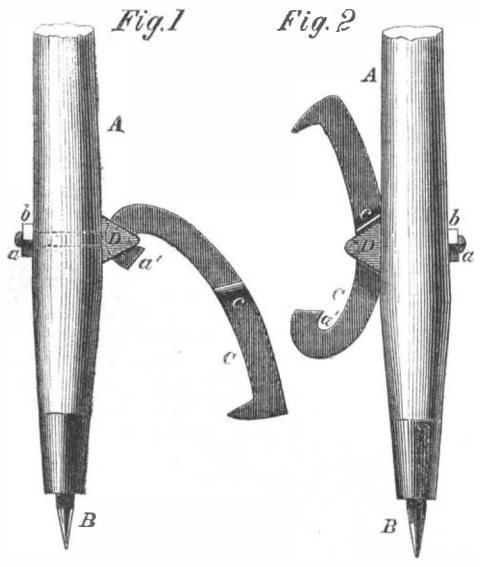




The scale, A, Fig. 1 is attached to the arm, B, which is connected by pivots, *c c*, to the fulcrum of the calipers, so that it may be turned out of the way when the implement is applied to an object, and then turned back against the end of the leg to measure the extent of the opening. For the sake of compactness the scale is applied to only one leg, the distance of which it measures from the middle, or point of meeting. To secure the opening of both legs precisely an equal distance from the middle, steel springs or straps are passed around the hubs of the arms, crossing each other in the manner shown in Fig. 2. These straps are provided each with a screw nut, *d d*, for drawing them perfectly tight and for adjusting the legs to the middle of the bar, B, before beginning the use of the implement.

The patent for this invention was issued Jan. 3, 1860, and persons desiring further information in relation to it may address the inventor, Charles D. Sutton, at Kensico, N. Y.

## IMPROVED CANT HOOK.

In handling heavy logs two implements are universally used, the lever and the cant hook. The latter, though exceedingly useful in rolling logs, is so awkward for any other purpose, that it is employed only for this; the long hook, swinging about loosely, being too much in the way except when it is grasping the log in the manner in




which it is designed. The inconvenience of very frequently laying aside one implement and finding another, has led to the invention which we here illustrate, the object of which is to combine both tools in one. This is accomplished by attaching the hook to the lever in such a manner that the hold may be quickly removed from the end to the middle of the hook, which is then held by the side of the lever, comparatively out of the way.

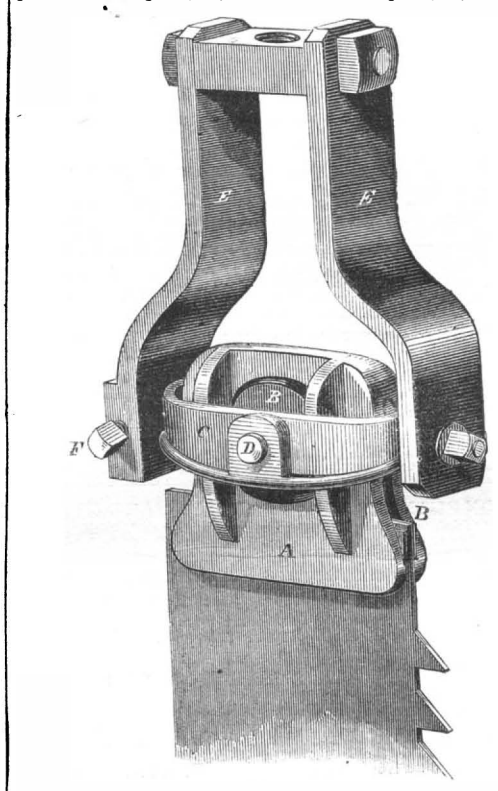
The lever, A, is made of the usual form, with the socket and spike, B, at its end, and the hook, C, is attached to it by means of the bolt, *a*, which has the slot, D, through its head. The hook, sliding loosely through this slot, is held by the bend, *a'*, at its end, when in use, and by the projections, *c*, in the middle, when not in use; when in the latter position being comparatively out of the way, and permitting the lever, A, to be used conveniently as an ordinary lever.

The patent for this invention was obtained, through the Scientific American Patent Agency, Jan. 3, 1860, and persons desiring further information in relation to it will please address the inventor, Peter Hinds, or W. Van Name (who is an equal owner in the patent), at Cedar Run, Pa.

## IMPROVED SAW BUCKLE.

The annexed engraving represents an improvement in buckles which are employed in fastening reciprocating saws into their frames.

It consists of two cast iron plates, A and B, which are secured into the iron hoop, C, by the pin, *d*. The upper portion of the plate, A, extends over the plate, B, while




a projection from the plate, B, passes through a slot in the plate, A, thus allowing the jaws of the plates to open sufficiently to receive the saw. On the inner sides of the lower ends of these are projections passing across the whole width of the jaws; the projections rising up to form a sort of dovetail joint. The saw has firmly riveted on each side, across its end, a strap or ledge of iron, shaped to fit the projections on the inner sides of the jaws. The hoop, C, is secured between the straps, E E, by pivots or pins at each side, one of which pivots is in a movable block or journal-box, which may be adjusted in the strap, E, by means of two set screws, one of which, *f*, is shown in the cut. By this arrangement it will be seen that the saw is strained equally throughout its whole width, and can be very readily adjusted to the line of its work.

The patent for this invention was obtained, through the Scientific American Patent Agency, March 15, 1859, and persons desiring further information in relation to it will please address the inventor, A. Crosby, at Fredonia, N. Y.

EXPLOSION IN A COAL OIL WORKS.—An explosion recently took place at the Aladdin Oil Works, in Armstrong county, Pa., caused by one of the foremen placing an open light, which he carried in his hand, in the vapor arising from the oil in one of the tanks. No explosion can take place with any oil until once it is evaporated and becomes gas, then mixes with the atmosphere. The vapor of any oil, when it becomes saturated with oxygen, is more explosive than gunpowder.

## THE BRITISH COTTON TRADE.

The cotton manufactures of Great Britain are gigantic in their proportions, and their growth has been wonderfully rapid. At present there are 500,000 persons employed in the cotton factories, and it has been estimated that there are 4,000,000 persons in that country dependent on the cotton trade for their subsistence. Lancashire is the chief seat of this great business. One century ago its population was 300,000; now it contains 2,300,000 inhabitants. This great increase exceeds that of any other equal surface, perhaps, in the world, and is entirely due to the development of the cotton manufacture. In 1858 there were in England and Scotland (the United Kingdom) 2,300 factories, running 36,000,000 spindles and 300,000 looms, by 100,000 horse-power. The amount of capital invested in it is estimated to be £60,000,000 (about $300,000,000). The quantity of cotton imported into England in 1859 was 1,181,800,000 lbs., which at 12 cents per lb., amounts to $141,816,000. The total number of bales was 2,829,110, of which no less than 2,086,341 were furnished from America; that is, out of every seven pounds received in England, five came from the United States. India furnished 500,000 bales; Egypt, 100,000; South America, 124,000; and about 8,000 bales came from various other countries. The value of the manufactured cotton goods sent from Great Britain annually is very great. In 1859 it amounted to £47,920,000 (about $239,600,000), which was equal in value to one-third of the entire exports (woolens, metals, &c.) of the United Kingdom. No less than $120,000,000 of cotton manufactures are consumed annually in Great Britain itself, independent of the export, thus showing how much the value of the raw product is increased by the manufacturing operations, all of which are dependent on a proper supply of cotton from America.

## ONE OF THE MYSTERIES.

MESSRS. EDITORS:—When sugar is struck with any hard substance in a dark room it emits a light. Will some of your scientific readers try this experiment and describe the nature and cause of this light, as it is not generally known. R. J. S.

Providence, Ky, March 9, 1860.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